NOTES

Dr. John D. Dwyer, Associate Professor of Biology, St. Louis University, has been appointed Research Associate at the Garden.

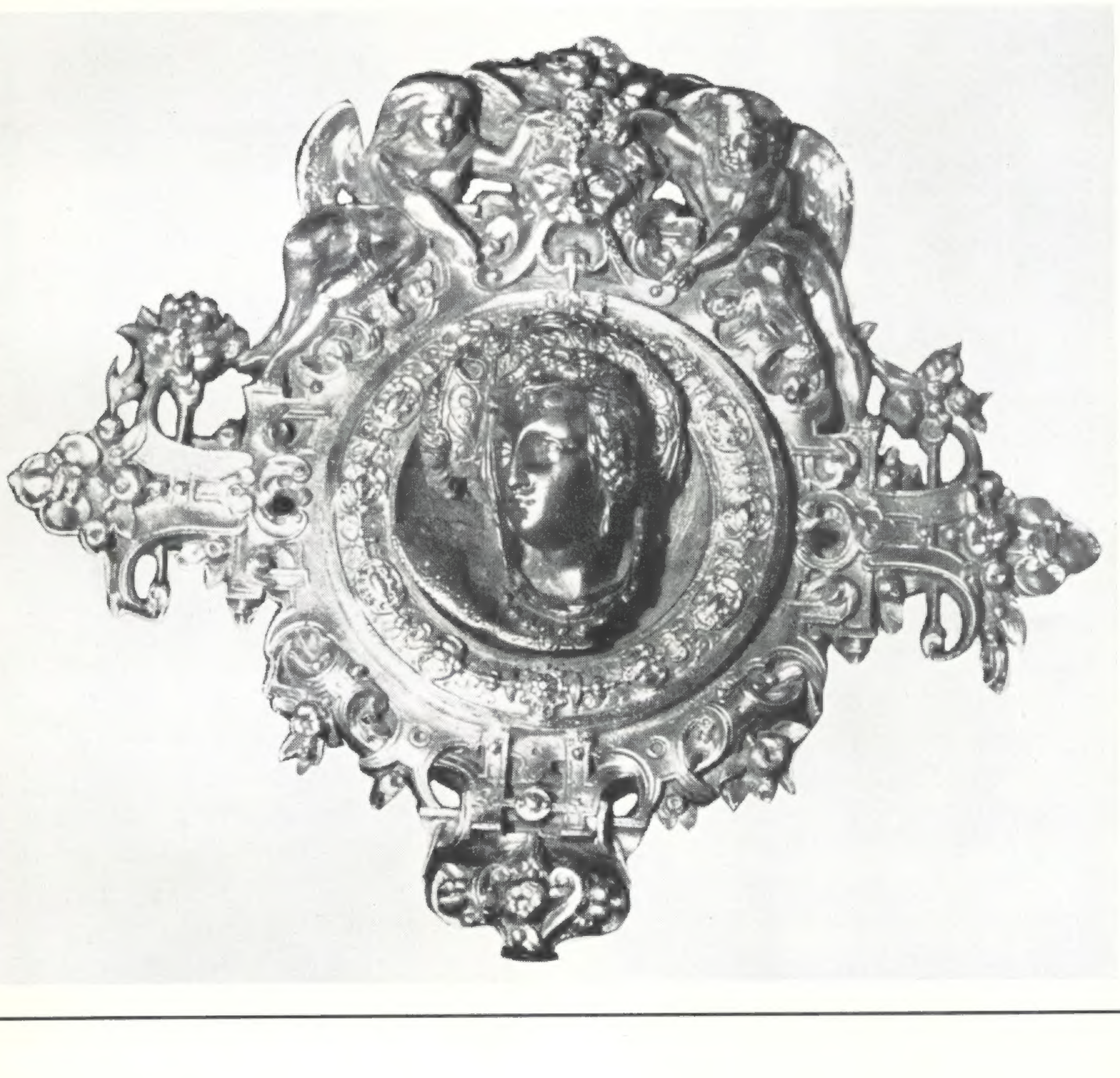
Recent out-of-town visitors to the Garden include Mr. Bertram H. Chalfant, president of the Nashville, Tenn., Orchid Society; Dr. George Thomas Johnson, of the University of Arkansas, Fayetteville; Dr. Ralph O. Erickson, of the University of Pennsylvania, Philadelphia.

Under the leadership of Mrs. George H. Pring, the Federated Women's Clubs of Missouri have taken over responsibility for serving as guides in Mr. Shaw's old country residence "Tower Grove." It is now open regularly every week day and Sunday from 1 to 4 p. m.

On the evening of November 16 the Chrysanthemum Show served as a background for an informal reception for the Horticultural Council, the staff, and the Trustees of the Garden. It was a clear moonlit night. The hanging baskets of chrysanthemums proved to be even more beautiful by artificial light than by daylight. The fifty-seven people who attended went home feeling as if they had been to a party in fairyland.

The children of the late Mrs. Edward Walsh are turning over to the Garden virtually all of her horticultural library. It includes many large and handsome volumes that the Garden would have liked to purchase when they appeared, but which were beyond its modest budget for new books. Mrs. Walsh was a gardener of distinction and a person of infinite taste. She had a lively curiosity which included many of the byways of horticulture, and was a frequent visitor to the Garden and its library. This gift of more than one hundred volumes brings us not only valuable books that we badly needed, but volumes we will also treasure just because they are from Mrs. Walsh's library. Outstanding among them are: Bailey's "Standard Cyclopedia of Horticulture," 6 vols.; Butler's "Floralia—Garden Paths and By-Paths of the 18th Century"; Byne and Stapley's "Majorcan Houses and Gardens"; Coffin's "Trees and Shrubs for Landscape Effect"; Conway and Hiatt's "Flowers: East-West"; Crane's "Flowers and Folk-Lore from Korea"; Fischer and Harshbarger's "The Flower Family Album"; Gothein's "History of Garden Art"; Gromort's "L'Art des Jardins," 2 vols.; Harlow's "Trees of the Eastern United States and Canada"; [Japanese Flower Arrangements], 9 vols.; Mrs. Leyel's "Herbal Delights"; Meade's "Bouquets and Bitters"; Otten's "Tuberous-rooted Begonias"; Parson and Cook's "Gardens of England"; Pean's "Jardins de France," 2 vols.; Mrs. Perrin's "British Flowering Plants," 4 vols.; Stebbing's "Colour in the Garden"; Tamura's "Gardens of Japan"; Tamura's "Art of Landscape Gardening in Japan"; Tatsui's "Gardens of Japan"; Wilder's "Pleasures and Profits of a Rock Garden."

MISSOURI BOTANICAL GARDEN BULLETIN



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Sixty-fourth Annual Report of the Director

Volume XLI January, 1953 Number 1

COVER: Central detail from the gate of Henry Shaw's city residence. This gate now opens on Tower Grove Avenue adjacent to the Administration Building at the Garden.

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Missouri Botanical Garden Bulletin

Vol. XLI JANUARY, 1953 No. 1

SIXTY-FOURTH ANNUAL REPORT OF THE DIRECTOR

To the Board of Trustees:

The Director of the Garden has the honor to submit his report for the year ending December 31, 1952.

The problem of having sufficient revenue to maintain the Garden and its various activities as established by Henry Shaw, continues to be a matter of concern to the Director and the Board of Trustees. The number of employees is at an all-time low, possibly because of the fact that the wage scale is below that of similar positions paid by the City of St. Louis. All the returns are not in, but it seems as though, for the first time in its history, the Garden would have a deficit at the end of 1952. Expenses have been cut to the lowest possible point, and it is evident that some means of increasing the income must be devised. Various methods are under consideration by the Board, and a public announcement will be made as soon as a decision is reached.

THE CITY GARDEN

Main Conservatories and Exotic Ranges.—

The succulent plant collection maintained in the two wings of the main conservatory range received major attention during the year. For two seasons no large-scale pruning and thinning out in the South African House have been carried out. As a consequence the Old World succulents such as various aloes and stoloniferous sansevierias spread all over the place, and the slender twining creeping stems of *Ceropegia caffrorum* covered everything in the beds like dodder does in the open. Three full weeks were devoted to cleaning, resetting, planting, indexing and labeling the plants. At least a full truck load of material was hauled out after a few plants and cuttings were selected for propagating purposes. At present about 45 kinds of South African aloes are growing in the house, and some 50 kinds of euphorbias which form the largest and tallest exhibits in the room. Among the euphorbias are many rare species, mostly raised from seed about twenty years ago. A 10-ft. *Euphorbia abyssinica* is probably the outstanding spurge,

its undulating ribs looking like writhing snakes extending from the tip to base of the plant. In this house is also a bed of *Aloe vera*, the leaves of which are used in alleviating X-ray and radium burns. The Garden has been supplying these leaves to three St. Louis dermatologists—one of a long list of services which our institution performs in the course of a year. In addition to routine care and maintenance work, excess gravel was removed from the walks.

In the Cactus House pruning was done on a smaller scale but several of the xerophytic trees and shrubs were severely pruned back in September, including *Cnidoscolus oligandrus*, *Parkinsonia aculeata*, *Acacia Farnesiana*, *Enterolobium cyclocarpum*, *Cochlospermum vitifolium*, and *Tecoma stans* var. *angustatum*. One night in the early part of June 176 flowers appeared on the two trellised Night-blooming Cereus. This established a record since the plants were set out in 1933, usually from 5 to 50 flowers a night appearing during the blooming season. This year more than 500 flowers were recorded for the blooming season of about four weeks. During the year a few of the plants collected by Ladislaus Cutak on his 1947 Mexican expedition bloomed for the first time. One was a night-blooming Selenicereus from Aguaje Guayabo in Oaxaca which appears to be closely allied to, if not a form of, *S. Nelsonii*. Another was an *Epiphyllum pumilum* from a rain forest in Chiapas, with fragrant white blossoms but differing in a few minor characteristics from the type. Still another was a terrestrial bromeliad from the Chivela-Nizanda district of Oaxaca which apparently is *Hechtia Meziana*, one of the few species with a branched inflorescence. The rarest additions to the cactus collection were two mature specimens of *Melocactus oaxacensis* donated by Mr. Charles Redler of Los Angeles, California. Both of them flowered and fruited during the year. The species is related to the bizarre Turk's Caps of Puerto Rico which have been featured on postage stamps. Dr. Reino Alava, of Turku University, Finland, a former graduate student at the Garden, dispatched 10 species of Rhipsalis as a nucleus towards a collection of these epiphytic cacti. Willi Wagner, heir to Quinta Fernando Schmoll, Mexico's largest cactus establishment, presented 115 different kinds of cactus plants in gratitude for identifying cacti for him. Dr. Norman Boke, of the University of Oklahoma, sent photos and kodachromes of several cacti which he wished identified for his histological work. Among the lot were pictures of a curious cactus in a private collection in Coahuila which could not be placed in any known genus in the Cactaceae. Steps were initiated to secure specimens and two small ones were received in June. One of them succumbed shortly after arrival, no doubt as a result of being weakened by fumigation at the border. The other is being nursed along in the hope that it will survive and be used for further study. This cactus is only

about the thickness of a lead pencil, the upper part of the stem being occupied by the slender elongated tubercles. The tubercles are crowned with pinhead-size areoles, in which there are about a hundred tiny spines, each carrying an umbrella of minute barbs at the tip. An areole viewed under a lens presents a most dazzling lacy pattern.

In June St. Louis was experiencing very hot weather which, of course, intensified the heat in the greenhouses. As an example, on June 29 the thermometer registered 128° F. in the Fern-Cycad House while the temperatures in the other rooms ranged between 110 and 116° F. An unusual number of plants dropped their leaves, and the ferns were literally burned. A roof shade had to be applied for the first time in about 10 years. Both *Cissus sicyoides* var. *Jacquini* and *Rhynchosia phaselloides* were cut down to the ground.

In the Banana-Coffee House a Wooden Rose vine *(Ipomoea tuberosa)* was set out, and soon its stems reached for the roof and then spread out over some of the tall Euphorbias and Kigelias. This plant has airy dark green leaves and festoons of lemon-yellow flowers which bloom during the month of December. The startling "wooden roses" produced after flowering are greatly sought by women for dried-plant arrangements and novelties.

In the Palm House a number of spray orchids *(Dendrobium bigibbum)* were attached to a Phoenix palm, and purple blossoms appeared in December. *Cattleya Schroederae* was also placed on tree trunks along with a few other orchid hybrids. The butterfly orchid *(Oncidium sphacelatum)* made a good show in April and May. Vanilla bloomed as usual in the spring and several flowers were hand-pollinated to produce "beans" which later were used in an exhibit by the Parke, Davis & Co., at Kiel Auditorium, during the druggists' convention in October. Since Tower Grove Park was curtailing their outdoor planting they presented the Garden with several specimen palms. Two of them, pygmy date trees about 6 feet tall, were planted in beds near the front entrance. The hedgy *Myrsine africana* is doing nicely near the entrance and puts one in mind of a boxwood. One tall Fishtail Palm, *Caryota urens,* had to be chopped down.

When the front and rear vestibules of the Palm House were remodeled large panel signs were installed telling, in words and drawings, the story of the palms and aroids. The signs have served a needed purpose and five out of ten visitors have been observed to stop and read them. The panels are made of tempered Masonite painted cream color with black lettering and silhouette drawings—the whole sprayed with four coats of white shellac for protection. Aluminum beading was used to frame them. They were executed by Ladislaus Cutak and required three full weeks to complete.

In the exotic ranges the usual routine was followed; however, an effort was made to propagate some of the rarer kinds of plants which came in during the previous year. Fern rootstocks were received from the Garfield Park Conservatory in Chicago and propagated for the Fern House which will be remodeled in the coming year.

The lily pools in the main garden were planted on May 6, a week earlier than in 1951. The weather was extremely warm and some of the potted water-lilies in the greenhouse tanks were beginning to drop their leaves. Besides the Garden hybrids, a number of new seedlings raised from seed collected in Australia the previous year were set out for trial in the outdoor pools. Although all three kinds resemble *Nymphaea gigantea* in more ways than one there were some distinguishing features, and dried material was prepared which will be sent to Bob Trickett in England to check with material in the Kew Herbarium. All of the seedlings bloomed profusely during the summer. The "Darwin Violets" which had been collected in a swamp lagoon is to be considered as a pygmy type with darker flowers than typical *gigantea*. The one from the Northern Territory is probably identical with the type plant from Queensland, and the third, received under the name of *N. violacea*, bears flowers midway in size between the pygmy and the type. Another import, a night-blooming Nymphaea from the Belgian Congo, can be likened to a miniature "Missouri." However, the leaves are smaller and the floral envelope often curves sharply downward almost parallel to the floral stalk while the stamens stay erect—a feature not before noticed in any of the nocturnal water-lilies grown at the Garden. This one is destined to become a very suitable lily for small pools. A first-generation cross between *N.* × "Talisman" and *N. sulphurea* will bear watching as it shows a strong viviparous character. Crosses between *N. sulphurea* and *N.* × "St. Louis" and *N. sulphurea* and *N.* × "African Gold" were also allowed to develop fully outdoors and two good forms were produced which merit naming. One of them produced a very full flower with 40 petals while the other can be likened to a glorified "St. Louis." Still another cross developed from *N. Heudelotii* and *N. colorata* has produced a very lovely dwarf lilac-colored flower with petaloid stamens like the beautiful *N.* × "Midnight," giving an indication that it will be the first semi-double in the dwarf class. Water-lilies were removed from the outdoor pools on October 24.

Mr. Ladislaus Cutak is in charge of the Main Conservatories and Exotic Ranges.

OUTSIDE GARDENS.—

Garden maintenance is always difficult in a dry season and the year 1952 paralleled the 1950 era of droughts. While the flood waters from the North and West were passing St. Louis last spring, our gardens were already in need

of a good shower. But that was only the beginning of the drought which lasted until mid-November. Lawns became parched, small plants were lost if not watered in time, and some of the woody plants will show the effects of the drought next year unless substantial rains fall during the winter and spring months. The hose and the permanent sprinkler systems were used a great deal throughout the season, but in a large garden it is not possible to care for all of the plants and so the watering program had to be keyed to the most important plants and gardens. A rainstorm undoubtedly kills many soft-bodied insects, but when there is no rain and the temperature is high the spider mites increase very rapidly. These mites were troublesome last summer, and even bedding plants, such as acalypha and tapioca, had to be sprayed to control them.

In the fall of 1950 and again in 1951, rose plants had not ripened sufficiently before their growth was cut short by an early freeze in November. The stems of many of the hybrid tea roses were blackened and had to be cut close to the ground level. Such hard pruning weakened the plants somewhat, but on the other hand, the roses were not affected by black-spot and mildew because of the low humidity. Seventy roses in nine varieties were purchased for the rose garden and three old-fashioned roses were donated by Mr. George D. Greene.

The Rose Society of Greater St. Louis sponsored a "Plant a Rose Week" beginning March 31. On Sunday afternoon, April 6, several members of the society demonstrated the proper way to plant and care for roses. It was planned to do this in the test rose plot which the Rose Society of Greater St. Louis is maintaining, but since the soil was too wet at that time the demonstration was performed on a table south of the Palm House. Some sixty interested rosarians gathered for this occasion and obtained help on soil preparation, planting, pruning and the best methods of controlling insects and diseases.

All of the beds in the Italian garden were top-dressed with leaf mold and this was worked into the soil with a powered tiller. Much time has always been consumed in spading the soil for the bedding plants, but with a new type mechanical tiller which is light enough to be lifted over the hedges it is possible to cultivate the soil in a very short time. A small gasoline-driven mower has also been a great aid in cutting the one-foot sod strips separating the many beds in the formal garden.

Many sections of the California privet hedge in the Italian garden were injured by the November 1951 freeze, which necessitated cutting down all of these plants in the spring.

Seventeen new varieties of peonies and fourteen varieties of Hemerocallis were planted in the Linnean garden in November, these being exchange

plants sent by the firm, Gilbert H. Wild & Son of Sarcoxie, Missouri. In the spring 550 gladiolus bulbs were planted in the Linnean garden at weekly intervals. These gave a fine display of flowers from July to October and of the nine varieties grown we liked the white, "Leading Lady," the best. The Tieman Test Garden of Florissant, Mo., donated eleven varieties of iris.

For four years the local Herb Society maintained two beds in the east end of the Linnean garden. Last spring plants from these beds were transferred to a new herb garden on the east side of the Administration Building. The beds that were vacated will again be planted with perennials in keeping with the remainder of the Linnean garden.

FLORAL DISPLAYS.—

The same schedule of floral displays was maintained as in recent years. The poinsettias were in the conservatory until January 20. A week later the orchids were staged, and this show continued until February 17. There then followed a display of various primroses, cyclamen, cinerarias, amaryllis and genistas, which was maintained until the Easter display was installed for the opening date of April 6. The flower sermon was preached in Christ Church Cathedral on April 27, and for this occasion numerous foliage and flowering plants were sent to the church. In May hydrangeas were the featured plants, and adjoining this display the St. Louis Horticultural Society staged a two-day spring flower show. Many iris were included in this show because the American Iris Society was convening in St. Louis May 18–20. Buses brought the convention visitors to see the gardens and the iris show on Sunday afternoon, May 18. A week later, May 24 and 25, the Rose Society of Greater St. Louis held its fifth annual rose show at the Garden. This was the first time the Rose Society brought its show to the display house, having held it previously in the Jewel Box at Forest Park. During the summer months the major displays consisted of fancy-leaved caladiums supplemented with gloxinias and delphiniums. On September 26 and 27 the Greater St. Louis Dahlia and Chrysanthemum Society held its annual show, and October 4 and 5 the Henry Shaw Cactus Society exhibited numerous cacti and succulents. On October 8 the Veiled Prophet Queen's orchid bouquet was displayed.

The staging of the chrysanthemum show was completed for the first Sunday in November, but since the chrysanthemums bloomed late this year the opening date was announced for November 9. In December the brilliant red Christmas poinsettia was displayed and also the pink and white variations.

This is probably as good a place as any in the report to describe Nature's own fall show. Every one will agree that it was the most gorgeous display of autumn color in many a season in this part of the country. After an early frost on October 6 there was a gradual increase in color in almost all

trees and shrubs with a brilliant climax about October 19. There was no rain nor wind to mar the show, a condition that seldom prevails in any year. Sumacs and barberries, oaks, birches, ginkgoes, sweet gums, sour gums, maples, tulip trees, all contributed their share of color. Photographers had a long field day to record all of the beauty of nature on their color films.

Mr. Paul A. Kohl, Floriculturist, is in charge of the outside gardens and the floral displays.

DENDROLOGY.—

Since a separate report of the activities of this department was not submitted for 1951, the present account will cover the two-year period, 1951-52.

In the past two years, three major projects have been in progress: (1) an inventory of the permanent living collections of hardy trees, shrubs, and woody vines, (2) labeling of the entire collection, and (3) plant introduction.

Inventory.—Unfortunately, over the years, a large percentage of the original metal record labels on the plants throughout the Garden has been lost. Every effort has been made to rename the entire collection as accurately as possible, but in a number of ornamental groups introduced under cultivar names, such as crabapples, mock-orange, lilacs, forsythias, cherries, which may also be of hybrid origin, the generic name is all that now can be indicated. Every effort shall be made in the future to safeguard the plantings against a similar fate. At present, the collections have been about 90 per cent inventoried. When completed, the inventory will show about 600 named trees, shrubs, and woody climbers, not counting the introductions since the beginning of 1951. The total woody-plant population at present stands at about 3,000 specimens. It is lamentable that in recent years, several severe storms have taken a heavy toll amongst the oldest and often handsomest trees in the collection. Not a single tree of the original grove of trees which Henry Shaw found here now remains, and very few of those planted by him are left either. The few remaining historical Shaw trees should and will be mapped and adequately marked.

Labeling.—The trees, shrubs, and hardy climbers are being labeled as rapidly as possible. Finally, the collection will be plotted on a series of maps, a system which is absolutely essential for the future and welfare of all valuable living collections. With reference maps available, a lost label will no longer be such a serious matter. A plane-table transit has been constructed for the purpose of mapping the present collection and all additions made in the future. All labels are made at the Garden, and are of two main types: (1) record labels, and (2) display labels. The record labels are stamped aluminum strips that will be tied to every plant in the collection. Two types of display labels will be used, one 4″ × 6″, made from .040″ raw

sheet aluminum, for trees and large shrubs, and the other for smaller shrubs, of redwood painted white, measuring 9″ long × 1½″ wide and ⅜″ thick. Both types are printed with rubber type, using a special weather-resisting black ink. A life of about ten years is expected for both types, which is about as economical as could be expected. During the current year, 4,804 labels have been made: 2,720 aluminum stamped record labels, 905 aluminum display labels 4″ × 6″, and 1,179 wooden tie labels. A duplicate set of display labels is made at the same time, to be used as the old labels wear out. For various seasonal outdoor displays, an additional 536 labels were hand-printed on green plastic.

Plant Introduction.—Under present conditions the future of the woody collections depends upon the maximum use of skilled maintenance with a minimum of help. However, it is hoped that plant introduction may be continued as an ambitious project of this department over some years to come. At least every effort is being made to introduce plants new and useful to the Garden's collections. In the current year, a total of 74 plants have been added to the permanent plantings, notably 34 Austrian pines *(Pinus nigra)*, 4–6 foot, which were moved from our nursery—now that practical smoke control permits us to grow conifers in the city again. Our first permanent plantings of the Dawn-Redwood (Metasequoia) are doing well, and a few specimens are now eight feet tall. Among the outstanding introductions is *Magnolia parviflora*, a native of Japan and Korea. Even though seedlings, our plants have come through four winters unscathed, and for the past two seasons have flowered profusely. This magnolia is a large deciduous shrub or small tree with dark green leathery leaves and scented white flowers 3–4 inches across, with a column of purple stamens. It flowers in May and June.

Over 850 woody plants, including many conifers, have been brought into the garden within the past two years, some to supplement what we already have, but mostly kinds not in the collection. Of this number, 284 were purchased, and the remainder received through exchange or gift. A policy will be followed of growing all new introductions in the nursery for a reasonable time before transferring them to the permanent collections. Although propagation has been kept to a minimum, much has been accomplished. Over the past two years, 262 packets of seed have been received from many sources, and we now have several hundred seedlings in various stages of development. Later, the surplus seedling material will be used for exchange. Propagation by cuttings has been likewise restricted, but over 700 ivy cuttings (*Hedera Helix* "Bulgaria") were made at the beginning of 1952 for planting on the street side of the garden wall along Tower Grove Avenue. Several hundred cuttings of boxwood (*Buxus sempervirens* and *B. microphylla*

var. *koreana)* from the Arboretum at Gray Summit, and a like number of various conifers from the Garden nursery have been inserted for rooting this autumn.

During the year, 37 trees were removed from the Garden, some as dead specimens, some to alleviate serious crowding of nearby plantings.

Dr. Frederick G. Meyer was appointed Dendrologist after his return from England in 1951 and has served in that capacity throughout 1952.

MAINTENANCE.—

Due to the age of the Garden property, more attention must be given each year to its maintenance. The routine work in the greenhouse and outside gardens demands considerable man hours, and with our limited skilled labor only the most necessary repairs and improvements can be made. The following work was done in the various buildings during 1952.

Main Conservatories.—The leaks in the roofs of the entrance and exit vestibules were repaired, thus permitting the panelling to be replastered and repainted. The paint on the columns at the main entrance was burned off, and after being scraped the columns received three coats of paint by the use of the spraying machine. A new column was installed to replace one which had so deteriorated that it had become dangerous to visitors. The southeast section of the roof glass was repainted, including the south gable of the Economic House. Four angle iron supports were replaced by channel iron corner supports. The deterioration of the old iron had caused settling and cracking of the eight plate-glass windows, making their replacement necessary. The interior of the south gable received two coats of paint. Three new copper down-spouts which carried the water from the lantern roof down through the interior of the house to the outlet drains were installed. The galvanized lantern gable at the south, the panels of which were rusting at the base, was repaired. Twenty-two new top ventilators were installed in the Cycad House. The badly decayed two columns at the entrance of the Economic House were replaced. This entire range is badly in need of reglazing and replacing of mullions.

During high winds and storms, the Floral Display House sways slightly; this is evident particularly during the Chrysanthemum Show when the baskets of chrysanthemums hanging from the roof are observed to swing. Due to this motion, bad leaks have developed at the base of the roof glass and cause considerable concern, especially during the flower shows when all exhibits are displayed on tables. The leakage has been somewhat alleviated by the installation of 290 feet of 6-inch guttering, which diverts the water through a series of down-spouts to the back of the planting area. The vestibule entrance was painted both on the interior and exterior. All the curved galvanized panels in the Citrus and Aroid Houses were sprayed with

aluminum paint. Six old mullions and 100 feet of angle iron purlins were replaced in the Citrus House and in the orchid display alcoves. The replacement of the old slate benches in the private growing houses with new concrete ones was completed during the year.

Linnean House.—Repairs in this greenhouse consisted of the following: installation of 360 feet of 6-inch guttering on the inside to catch leaks from the base of the roof glass above; replacing the old galvanized guttering and flashing above the south gable entrance with copper; tuck-pointing the brickwork on the entire building.

Horticultural Research Greenhouse.—The entire north greenhouse was reglazed and repainted, bad cracks were filled, and the connecting potting sheds were painted.

Surface Sheds and Garages.—The storage house for floral displays was repaired, using 150 feet of lumber. All doors and window sashes were repainted. It might be of interest to mention that the window sashes date back to Henry Shaw's time, having been used in the greenhouse which stood where the rose garden is now.

Residences.—The residences of both engineers were redecorated and both were painted on the outside, including all the screens.

The vestibule at the entrance of the Director's Residence was replastered. The ceiling of the entrance was replaced and redecorated.

The Old Residence was repainted on the exterior, excluding the tower.

The Cleveland Avenue residence was painted on the exterior, and all the interior woodwork was cleaned. When necessary, window sashes were replaced before painting. The basement foundation was tuck-pointed and painted.

Main Entrance.—The ladies' and gentlemen's rest-rooms were redecorated, as were the four office rooms. During October it was necessary to redecorate the ladies' reception room again because of the lipstick smeared on the walls. Two new copper down-spout flashings were installed on this building.

Administration Building.—The roof coping was repaired and tuck-pointed, and the window sash at the south end of the building was painted and caulked. A bad foundation leak was repaired by digging below the basement floor level and applying asphalt water-proof covering on both the old foundation and the concrete footing at the south end.

Museum.—The north and south entrances were painted, and the north gable roof flashing which had been damaged by wind storms was replaced.

Fences.—The breaks in the iron fences around the mausoleum were welded. The iron fences along Tower Grove (excluding the main gate), Magnolia, and Alfred Avenues were painted, as was the cyclone fence which

runs from Shaw Avenue to Russell Avenue. In all, 4,261 linear feet of fencing were painted, 110 gallons of paint being used. A great saving of paint was effected by using the swab roller instead of the brush, but on the iron picket fence it was necessary to use the brush. Eighty feet of the cyclone fence and the gate on Alfred Avenue were wrecked by autos. The cost of the repairs was covered by insurance.

ROUTINE MAINTENANCE.—

Painting was done on over 100 garden benches, drinking fountains, background used in floral displays, wheel-barrows, hand carts, etc. Motor equipment was overhauled, including two Toro lawn mowers. Two sickle bar cutters, six stand-by gasoline heaters, large tractor, and automobile equipment were kept in repair. Also repaired were two water-lily pools in the Economic Garden. Greenhouse ventilator controls were greased and oiled; electric sterilizer for the experimental house was rebuilt, and one mile of side-walk kept free of papers and rubbish, and snow in winter.

The maintenance of the City Garden is under the direction of Mr. G. H. Pring, Superintendent.

BOILER HOUSE.—

Major improvements to the boiler house were completed during the summer of 1952. Two 205-horsepower Heine Water Tube Boilers, 40 years old, have been replaced by two new Springfield Water Tube Boilers, each with a nominal rating of 210 horsepower and a maximum continuous rating of 400 horsepower. The oil burners formerly installed in the old boilers were reinstalled in the new boilers.

After the new boilers were erected, work was commenced on the extensive new piping work required to connect the two new boilers to the remaining boiler and the existing steam distribution system. The design of the new boilers required the installation of entirely new breeching to the existing smokestack; the new breeching is now equipped with automatic damper controls to each of the three boilers.

A new 400-horsepower boiler feed water pump was added to the pump room for use at times when the heating load is very light, early in the fall and late in the spring. The boiler feed water is now treated in a new water softener for the control of boiler scale.

Careful advance planning, together with the close cooperation of all engaged in this work, was necessary to make certain the work would be completed before the commencement of the 1952-53 heating season.

All of the above improvements in the boiler house were done by various contractors working under the supervision of Mr. A. H. Vogel, consulting engineer, who prepared the original plans.

While the contract work was progressing, regular employees of the Garden under the Garden's full-time engineer were busy throughout the summer on the usual maintenance of the steam distribution system. The most important work accomplished was the replacement and relocation of 3,000 feet of 1¼" pipe serving as heating coils in the various greenhouses.

This continues the policy of replacing every year a certain number of the old heating coils, which show the greatest amount of wear. Eventually, all of the old heating coils will be replaced by new ones in this manner.

ARBORETUM

There is no doubt but that "amazing" and "unusual" only partly describe the "weather" of the past twelve months. This first half of the year furnished excellent growing conditions and all plants responded. The last half, however, showed clearly how unusual weather could become and still be "typical" of Missouri. Fortunately, with the start plants had in the spring they were able to survive the summer and fall. Some damage was done in the Pinetum but mainly to two species, the Scots Pine and the Japanese Red Pine. The varieties of Scots Pine which were available at the time that the Arboretum was started had reached maturity. The Japanese Red Pine is a short-lived species whose life span was rapidly ending. A few of each species succumbed each year, no matter what effort was made to keep them growing, so it is no surprise that many more died this year as a result of the protracted dry, hot weather. Very little damage can be observed among other plantings. However, a continuation of the dry spell, well into the winter, might increase the usual mortality and appear as serious "winter injury." In no recent year has so much water been pumped from the Pinetum lake to the reservoir nor has so much hauling of water been necessary to irrigate plantings outside the range of reservoir lines. The extremely low stage of the Pinetum lake permitted re-digging and shaping of the shore line. This work, done with dragline and truck, has materially increased the capacity of this lake. By deepening the gently sloping shore line it is hoped that control of algae and aquatic weeds will be simplified. The removal of this soil enabled us to fill and grade some local areas which have been or will be planted with additional conifers.

The "chipper" has been given extensive use. Our experience indicates that the time required to dispose of brush is $^1/_{16}$ that of loading and hauling by truck and about ⅓ that required to pile and burn. The "chips" have been used extensively as mulch, composted with stable manure, and as cattle bedding. So far no ill effects have been observed even when spread on a field without previous treatment. A similar use of corncobs or sawdust would result in a serious nitrogen deficiency. Rather, their use in a nursery field

seemed to be stimulating to the soybeans being grown for a green manure. Brush from the clearing of a field and "thinnings" from a forest improvement program thus become a new source of organic matter when returned to the fields via the cattle barn.

Public interest in the Arboretum is best expressed by the 892 cars of visitors counted on week-ends during April; only in January and December were there less than 100 cars per month. Such traffic over gravel roads results in considerable wear, especially if the weather is so dry that the use of the grader to re-shape the roads would aggravate the dust problem. No additional gravel was needed for road re-surfacing this past year.

In combination with a single truck the dragline was used extensively during the year to deepen the edge of the Pinetum lake, to load and dig soil at the Meramec River, to fill the last portion of the ditch at Pot Hole Lake, to excavate for the septic tank and disposal field at the laboratory, and finally to remove the silt from the East Bridge pool. The filling of ditches, even by the use of heavy equipment, is a time-consuming and laborious job; yet the improvement in the landscape and especially the time saved in mowing soon pays for the operation. About 650 acres at the Arboretum must be mowed at least once annually and those portions not grazed may require mowing in June and again in September. A rough field, bisected with ditches, will take twelve times as long to mow as a similar acreage after grading.

Planting and nursery work continue at a reduced rate. Because of the dry summer it was indeed fortunate that no more plants had been set out the preceding summer. Plantings are successful only when maintenance during the following two seasons is assured; propagation and plantings can easily outstrip the maintenance facilities. Work with the fast-disappearing prairie flora continues. A century ago these plants were of prime importance to wildlife and the honey bee, and their re-establishment as sources of nectar and pollen for bees and food and cover for quail appears worth investigating. None of the species with which we are working are agricultural crops and none are in commerce. They are not grown to-day because they have not exhibited the adaptability so necessary for a place in the agricultural program. It is hoped that strains will emerge, as a result of selection, which will find a place in the stepped-up program to provide dependable sources of food and shelter for wild life.

Through financial assistance provided by the Garden Club of St. Louis, it has been possible to continue work on the Wildflower Trails. Most of the directional signs and wooden plant labels will be refinished in time for the spring display. An effort will be made to finish an illuminated map of the Trail System as an aid to visitors. Crushed stone has been placed on certain

footpaths and major trails. During the peak of the fire season a hydraulic sprayer was used to free the trails of leaves. The rig towed by a tractor used two high-pressure guns to sweep the trails; thus providing a fire break up to ten feet wide. The wild flower display was cut short by the relatively short spring, but the fall display of certain species was better than ever.

Although the Arboretum was not closed during the dangerously dry period we had no fire on the grounds; this speaks well for the thoughtfulness and care of those visitors who walked through the woods during that explosive period. Unfortunately, there was little to see during this time when Missouri was burned brown, and only the hardiest enthusiasts were tramping the Trails.

The Arboretum is under the management of Mr. A. P. Beilmann.

ORCHID DEPARTMENT AT THE ARBORETUM.—

Despite a three-month summer period which included 56 days of over 90° temperature, the orchid range enjoyed a record production of flowers. Including the botanical varieties, there were over 75,000 blooms.

Laeliocattleya "St. Louis" var. "MoBotGard" gained the distinction of being the first hybrid orchid raised at the garden from seed to receive an "Award of Merit" certificate. The flowers from this plant were exhibited on November 15 at the American Orchid Society meeting, in Houston, Texas, where the award was given. Six new hybrids were named and registered at the meeting: *Cattleya* "D. S. Brown," *Laeliocattleya* "A. A. Hunter," *L. C.* "C. W. Powell," *L. C.* "L. Ray Carter," *L. C.* "Tower Grove" and *Sophrolaeliocattleya* "MoBotGard."

Again, as last year, all the Cattleyas featured in the bouquet of the Veiled Prophet's Queen were hybrids developed by the Garden. Outstanding in the group was *Laeliocattleya* "Dr. George T. Moore." Besides its magnificent color, this new hybrid has excellent shape and texture as well as remarkable "keeping" qualities.

Two new bronze name plates have been placed in the orchid range. One is in honor of the late Mr. D. S. Brown, who, in 1918, donated his private collection of orchids to the Garden. This fine block of plants has served as a foundation upon which the Garden's present outstanding collection has been built. The other plaque is to honor Mr. Herbert L. Dillon of Long Island, New York. Mr. Dillon, during 1949, 1950 and 1951, presented various parts of his fine orchid collection to the Garden, one greenhouse being devoted solely to these plants.

A different technique for sowing orchid seed has been used during 1952. Instead of allowing the seed to remain in the pod until ripened and dry, it is removed as soon as the embryos are developed, and sown in this green state. Excellent germination has resulted, using seed of various hybrid crosses which previously had appeared to be sterile.

One hundred and fifty bags of osmunda fiber were used in maintaining the plants in good growing condition. Approximately 35,000 plants were repotted.

Parathion Aerosal bombs were again effectively used as our only greenhouse insecticide. Four complete applications, consuming an over-all total of less than eight hours, did a very thorough job.

During the year, the orchid range has had an unsually large number of visitors from various parts of the country. Many of these were amateur and "hobby" growers. There were also numerous garden clubs, student groups, and groups from various organizations. The Orchid Society of Greater St. Louis held its October meeting at the greenhouses.

Maintenance.—

All the general maintenance at the orchid range and related buildings was carried out by the boiler-room crew, under the supervision of Mr. Roy Kissick, chief engineer.

One greenhouse 26′ × 100′ was completely reglazed, repainted, and all glass reset with aluminum bar caps. The frame work was erected for a house 13′ × 100′, which will enclose the area between two of the larger houses. This winter, as weather permits, the glass is being set with aluminum bar caps.

During the spring, the east half of the laboratory building adjoining the orchid range was converted into a two-room residence apartment. By the erection of an interior wall, the west section was retained as a three-room laboratory area. The interior of the entire building was given two coats of paint. Since its erection in 1946, the walls have had only a plaster finish.

A steam line from the greenhouses to the orchid-grower's residence was installed during the summer. A ditch 95 feet in length was dug, and 16 cubic yards of concrete used in pouring a trench to carry the necessary steam pipes from the main heating plant. To complete the job, 140 feet of 2½″ pipe, 240 feet of 1¼″ pipe and 15 feet of 1″ pipe, along with the necessary valves and fittings, were used. While the initial expenditure for this improvement was not great, the savings realized from it during future years should be considerable. The oil-burning furnace, formerly used in the residence, was left intact as an emergency unit.

The task of rebuilding new cypress staging over the entire range is being carried out as time permits; 325 feet of 5-foot staging and 200 feet of 4-foot staging were constructed this year.

The orchid range is in charge of Mr. G. R. Lowry.

MISSOURI PLANT SURVEY

During 1952 plant collecting was carried on in fifty counties in Missouri but principally in the still little-known northern and north-central counties

of the state, where no drought marred the vegetation as in the Ozark area to the south. Hundreds of new records filled in important gaps in the natural limits of geographical distribution of each species.

A highlight of the survey was the rediscovery of the Small Whorled Pogonia orchid *(Isotria medeoloides)*, one of the rarest orchids in the United States. Mr. Colton Russell had found it in 1897 in Bollinger County, but attempts to locate it again had always failed. During 1951 Mr. Oscar Petersen reported finding it in Ste. Genevieve County, and he and Dr. Steyermark made a special trip to the locality in the late spring of 1952. The report was verified, and specimens for the herbarium have now been obtained. A further report on this plant will be made in a forthcoming number of the BULLETIN. Other second collections made in the state were the following: (1) Tufted Loosestrife *(Lysimachia thyrsiflora)* from Atchison County, previously known only from Jackson County; (2) *Carex trichocarpa* and *C. stricta* var. *strictior*, both from Maries County, previously known from Reynolds County.

A rare and little-known Phacelia *(P. ranunculacea)*, previously known in Missouri only from the southeastern lowland counties, was found by the thousands in Texas County, over a hundred miles by airline in the Ozarks from its nearest station. The rare orchid, Rattlesnake Plantain *(Goodyera pubescens)*, was found in Reynolds County, and an additional record from Iron County has been communicated to the writer by Mr. Bill Bauer.

A colony of hybrid Hepatica was discovered in Reynolds County. It is unusual to find both species of Hepatica *(H. acutiloba* and *H. americana)* on the same hillside, since their ranges within the state seldom approach one another. In this instance the *H. acutiloba* occupied the lower and middle slopes, and *H. americana* the uppermost, but intergrading forms occurred on the margins of their habitats. This colony may become important in future studies concerning the genetics and taxonomy of these two species. Among other unusual plants found were: white-flowered forms of *Hydrophyllum virginianum* and *Houstonia minima*; a pale yellow form of the Puccoon *(Lithospermum canescens)*; and a pale lilac-white form of the Ironweed *(Veronia altissima)*.

Such rarities in Missouri were found as Great St. John's-wort *(Hypericum pyramidatum)* in Holt County, one of the rosinweeds *(Silphium speciosum)*, in Holt, Atchison, and Nodaway counties, and the Blue Lettuce of the loess mounds of Atchison and Holt counties was found in Nodaway County. The Leatherwood *(Dirca palustris)* was collected in Grundy County in a remote sandstone ravine. This is the second northern Missouri record for this species, all the other stations being in Ozark counties.

The northernmost station for the persimmon *(Diospyros virginiana)* in

Missouri was located during this year in Scotland County near the Iowa line. In Mercer County, another northern county bordering the Iowa line, were found *Spermolepis inermis* and *Specularia leptocarpa*, both of which had previously been confined to the southern and central counties of Missouri. Near the Iowa line in Scotland County, a remote densely forested area which the writer had for years planned to visit, was surveyed and many rare and unusual species were collected. It is fortunate that a survey of this area was made then as the owner has planned to tear up the area with a bull-dozer in the spring of 1953 for purposes of agriculture.

Other regions where important discoveries were made are the following: (1) A natural lake in Grundy County, northwestern Missouri, where were found Pickerel Weed *(Pontederia cordata)*, two species of Bur-reed *(Sparganium eurycarpum* and S. *androcladum)*, Bladderwort *(Utricularia vulgaris)*, and a Water Milfoil *(Myriophyllum heterophyllum)*, being a new northern limit for this species. Many other aquatic plants were growing profusely—a matter of interest, since some, like the Pickerel Weed, are infrequently encountered in the state. (2) Ralls and Pike counties where Ozark species were recorded for the first time, adding to the evidence that this part of Missouri is Ozarkian and escaped glaciation. (3) Unusual isolated bluff in Moniteau County, a new western limit in the state for such species as Miterwort *(Mitella diphylla)*, a rare phlox *(Phlox amplifolia)*, and White Baneberry *(Actaea pachypoda)*. Occurring with them were such plants as Ginseng *(Panax quinquefolius)*, Yellow Lady's-slipper *(Cypripedium Calceolus* var. *pubescens)*, Golden Seal *(Hydrastis canadensis)*, Yellowish Bottle Gentian *(Gentiana flavida)*, and many others, giving new range extensions of both Ozark species and ones found farther north in the state such as the Honeysuckle *(Lonicera prolifera)*. (4) Natural swampy meadows in Phelps County where such rare species were discovered as White Turtlehead *(Chelone glabra)* and the sedge, *Rhynchospora capillacea*. Unusual variation in *Rudbeckia speciosa* and *R. umbrosa*, found at this station, gives promise of providing botanists interested in this genus a fertile field for taxonomic and genetic studies. (5) Camden County, a new northwestern limit, in an interesting swampy meadow, for species otherwise confined to the eastern part of the state.

In the October number of *Rhodora* an account of some of the major finds made in Missouri during the past two years emphasized the amount of field work yet to be carried on. In the April-June number of the *American Fern Journal* appeared a report of the new ferns and fern allies made by the writer and Mr. E. J. Palmer during 1951. As the 1952 collecting season came to a close, the writer received specimens from Professor Kucera, of the University of Missouri, of the Sheepberry *(Lyonia mariana)* discovered by

him in Dent County. This member of the heath family, previously uncollected in the state, indicates how much yet remains before anything like a truly adequate knowledge of the state flora is at hand.

The Missouri Plant Survey is carried on by Dr. Julian A. Steyermark, of the Chicago Natural History Museum, Honorary Research Associate at the Garden.

GENETICS.—

Dr. Edgar Anderson, the Assistant Director, has spent a major portion of his time on a series of projects which concern the relation between the Garden and the public. Working with Mr. Lad Cutak, he redesigned the entrances to the palm house which have long been a problem.

Another project has been the preparation of a series of articles about wild flowers, designed for the general public. The first of these, a description of our commonest autumn wild flowers, has been completed and was published in the BULLETIN for September and October, 1952.

Dr. Anderson's research program continues to be centered around the efficient measurement of species differences and the use of these measurements in analyzing evolution in natural populations and in domesticated plants. In June he illustrated and discussed these techniques at a conference of bio-statisticians arranged by the statistical department of Iowa State College. An invitation from Stanford University to serve as a visiting professor of Biology during the spring quarter allowed him to try out his techniques on the highly variable flora of the California Bay region.

Dr. Anderson's studies having shown with increasing force the importance of hybridization as an evolutionary factor, he has this year begun a series of controlled experiments with natural and artificial hybrids. A grant from the Atomic Energy Commission has enabled him to extend these experiments and to associate with the program Dr. Henry McQuade of the Biology staff at Harris Teacher's College.

The techniques worked out by Dr. Anderson and others for the measurement of evolution are also being used to study the evolution of plants under domestication; in other words, to study the origin and the history of the plants most closely associated with man. Several of Dr. Anderson's graduate students are carrying on investigations in this field. In September Mr. George McCue received his master's degree, his thesis having been a study of the history of the uses of the common tomato. It has just been published in the ANNALS. Mr. George Freytag, who has been in charge of Dr. Anderson's small experimental plot in Honduras, has returned to Washington University where he is continuing his graduate work, making detailed studies of variation in the common bean.

In June Little, Brown and Company brought out a book by Dr. Ander-

son, *Plants, Man, and Life*. It is designed for the general reader and discusses the insights gained into man's own history from the study of these plants which have so long been associated with him.

PALEOBOTANY.—

Dr. Henry N. Andrews, Jr., Paleobotanist to the Garden and Dean in the Henry Shaw School of Botany, has continued with his studies of the petrified plants of the central coal fields. Several collections have been made during the year, chiefly from southern Illinois and eastern Kansas. An increased teaching load, due to sharp reductions in the University budget, has reduced the time available for research. However, some progress has been made in his investigations of the early ferns and seed plants, and notable contributions have been made by one of his graduate students, Mr. Charles J. Felix. During the spring Dr. Andrews completed the "Generic Index of Fossil Plant Names," a project that he had been working on for three years under the jurisdiction of the United States Geological Survey; this is now in the process of publication by the Survey.

A field trip was made in August to the southern shores of the Gaspé region in Quebec to obtain specimens of the peculiar Devonian alga Prototaxites. The acquisition of this and other fossil plant material during the year has materially added to the value of our paleobotanical collection as a teaching and research tool.

MYCOLOGY.—

Dr. Carroll W. Dodge, Mycologist to the Garden and Professor in the Henry Shaw School of Botany, has spent much of the time available for research in identifying miscellaneous collections sent in by correspondents from the southwestern United States, the Antilles, northern and western South America and Nigeria, and has begun a study of the collections of the Australian National Antarctic Expedition from Heard and Macquarie Islands where meteorological stations are being maintained. The accumulation of unidentified fungi and lichens has been sorted by major groups and they are now available for study by specialists.

Since assuming responsibility for all non-vascular cryptogams, our small accumulations of algae have been named by specialists and inserted. All the unidentified collections of mosses and hepatics have been sorted, most of the mosses identified by Henry S. Conard and Edwin Bartram, the Sphagnaceae by A. LeRoy Andrews, the Fontinalaceae by Winona Welch, and the hepatics by William Rissanen and Margaret Fulford.

Mr. Emanuel Rudolph, Research Fellow in Mycology, completed the routine insertion of fungi and lichens and has begun sorting the accumulated mosses and hepatics preparatory to insertion. The volume of this material is nearly equal to that of the organized herbarium of these groups. In

accordance with the new policy of placing type specimens in special folders, a search of the literature has revealed many types, especially in the classic collections of the Bernhardi herbarium, greatly enhancing the value of the herbarium for students of these groups. In this work we have found many duplicates for which we have received valuable specimens in exchange.

The usual courses in bacteriology and mycology have been offered during the academic year, assisted by Messrs. Sidney D. Rodenberg, Richard N. Kinsley, Jr., and George Chiligiris. Routine identification of mushrooms and cultures of fungi (human pathogens, plant pathogens, and saprophytes which were proving industrial nuisances) have been made for correspondents. The results of the study of tropical African lichens, mostly from Nigeria, are being prepared for publication.

HORTICULTURE.—

Dr. Gustav A. L. Mehlquist, Research Horticulturist, resigned in June to accept a position as Professor of Horticulture at the University of Connecticut.

SYSTEMATICS AND FLORISTICS.—

Dr. Robert E. Woodson, Jr., Curator of the Herbarium, completed a revision of the North American species of Asclepias upon which he had been working for several years past, with the aid of a grant from the American Philosophical Society. He also was enabled to continue his studies of the population genetics of *Asclepias tuberosa* with the aid of grants from the National Academy of Science and the American Academy of Arts and Sciences. A second grant from the American Philosophical Society is enabling Dr. Woodson and Mr. Bernard C. Mikula to continue the photographing of type specimens of African plants at the British Museum (Natural History) and the Royal Botanic Garden, Kew, which was begun by our Dr. Frederick G. Meyer three years ago.

Dr. Rolla M. Tryon, Assistant Curator, has continued his study of the species of Selaginella allied to S. *rupestris*. Dr. George B. Van Schaack, Honorary Curator of Grasses, has continued reorganizing the grass herbarium, ordering up the genera Hordeum and Agropyrum and extracting duplicates in these and other groups. He also has initiated a study of Aleutian Poae.

Mr. Robert Cooper, assistant in the herbarium, is completing his revision of the Australasian species of Pittosporum in partial fulfillment of his candidacy for the degree of Ph.D. in the Henry Shaw School of Botany of Washington University. Mr. Cooper is studying here on leave from his duties as curator of the herbarium of the Auckland (N. Z.) Museum.

Mr. Jorge León, of Turrialba, Costa Rica, and Mr. Antonio Molina R., of Tegucigalpa, Honduras, are Guggenheim Fellows engaged in studies of the Central American species of the genera Inga and Cephaelis, respectively.

Mr. Ding Hou, of the National Taiwan University, Free China, is a China Institute in America Fellow, and is engaged in a world-wide revision of the genus Celastrus. Both Mr. León and Mr. Hou are candidates for the degree of Ph.D. in the Henry Shaw School of Botany.

At Washington University's June commencement exercises, the degree of Ph.D. was awarded to Mrs. R. M. Tryon, Mr. John M. Gillett, and Mr. Hugh H. Iltis, whose research topics while studying in our herbarium comprised the genera Pellaea, Gentianella, and Cleome, respectively. Dr. Gillett has returned to his duties with the Canadian Department of Agriculture at Ottawa. Dr. Iltis has joined the Department of Botany of the University of Arkansas. Dr. Tryon is now an assistant in the Garden library.

DEGREES AWARDED IN THE HENRY SHAW SCHOOL OF BOTANY.—

At the June 1952 commencement the degree of Doctor of Philosophy was conferred upon the following: Robert A. Dietz, B.S., The Principia, M.A., Washington University (Genetics); John M. Gillett, B.A., Queen's University (Taxonomy); Hugh H. Iltis, B.S., University of Tennessee, M.A., Washington University (Taxonomy); Alice F. Tryon, B.S., Milwaukee State College, M.S., University of Wisconsin (Taxonomy); and Milton L. Zucker, B.A., Washington University (Physiology).

The degree of Master of Arts was conferred upon the following: Ding Hou, B.S., National Chung-Cheng University (Taxonomy); William B. James, B.A., University of Delaware (Physiology); and Yoneo Sagawa, B.A., Washington University (Plant Breeding).

GRADUATE STUDENTS.—

The following graduate students were registered in the Henry Shaw School of Botany in 1952:

Graduate Teaching Assistants: Eddie Basler, Jr., B.S. and M.S., University of Oklahoma (Physiology); George A. Chiligiris, B.A., Washington University (Microbiology); Charles J. Felix, B.A., University of Tennessee, M.A., Washington University (Paleobotany); William B. James, B.A., University of Delaware, M.A., Washington University (Physiology); Richard N. Kinsley, Jr., B.A., Earlham College (Mycology); George A. McCue, B.A. and M.A., Washington University (Genetics); Bernard C. Mikula, B.S., College of William and Mary (Taxonomy); Norton H. Nickerson, B.S., University of Massachusetts, M.A., University of Texas (Genetics); and Roanne H. Roeyer, B.A. and M.A., Washington University (Physiology).

Graduate Research Assistants: Yoneo Sagawa, B.A. and M.A., Washington University (Plant Breeding); Dorothy Schieber, B.A., Washington University (Physiology); James Warnhoff, B.A., Washington University (Physiology); and Masashi Yamada, B.A. and M.A., Washington University (Physiology).

Guggenheim Fellows (Latin American): Jorge León, Inter-American Institute of Agricultural Sciences, San José, Costa Rica (Taxonomy), and Antonio Molina, Escuela Agricola Panamericana, Tegucigalpa, Honduras (Taxonomy).

Henrietta Heermans Scholar: Robert A. Dietz, B.A., The Principia, M.A. and Ph.D., Washington University (Genetics).

Instructors in University College: Burton R. Anderson, B.A., M.A., University of Massachusetts (Paleobotany); and Robert J. Gillespie, Jr., B.A., Washington University (Plant Breeding).

Jesse R. Barr Fellows: Nalini Nirodi (Genetics); and Dorothy Ober, B.S., Cornell University (Plant Breeding).

National Science Foundation Fellows: Marilyn A. Gage, B.S., Pennsylvania College for Women, M.A., Washington University (Plant Breeding); and Sidney D. Rodenberg, B.A. and M.A., Washington University (Physiology).

U. S. Public Health Fellow: Milton L. Zucker, B.A. and Ph.D., Washington University (Physiology).

University Fellows: Robert C. Cooper, M.A. and B.Com., University of New Zealand (Taxonomy); and Hugh H. Iltis, B.S., University of Tennessee, M.A. and Ph.D., Washington University (Taxonomy).

University Remission of Tuition: Emanuel Rudolph, B.A., New York University (Mycology); and Harry R. Skallerup, B.S., University of Illinois (Genetics).

Van Blarcom Tuition Scholar: Ding Hou, B.S., National Chung-Cheng University, M.A., Washington University.

Independent Students: George F. Freytag, B.A., University of Wyoming, M.A., Washington University (Genetics); John M. Gillett, B.A., Queen's University, Ph.D., Washington University (Taxonomy); Thomas A. Graven, B.S., Washington University (Plant Breeding); Ada M. Jordan, B.S. and M.A., University of Missouri (Plant Breeding); Taylor E. Lindhorst, B.S., College of Pharmacy (Physiology); Frank W. Martin, B.S., College of Pharmacy (Physiology); Glenn E. Pollock, Jr., B.S., Washington University (Microbiology); William H. Von Meyer, B.A., Washington University (Microbiology); and Byron H. Wise, B.S., University of Florida (Taxonomy).

PUBLISHED ARTICLES.—

Paul H. Allen, Tropical Plant Collector: Distribution and Variation in Roystonea. Ceiba 3[1]:1–18; The Swan Orchids: A Revision of the Genus Cycnoches. Parts I–V. Orchid Jour. 1:173–185, 225–230, 273–277, 397–403; *Telipogon Endresianum* Kränzl. Orchid Jour. 1:292–293.

Edgar Anderson, Assistant Director of the Garden: Our Common Native Wild Flowers. Parts I and II. Mo. Bot. Gard. Bull. 40:111–136; Plants, Life and Man. Publ. by Little, Brown and Co.; Summer Flowers which Linger into Fall. Mo. Bot. Gard. Bull. 40:136–137; Wild Flower Trails at the Missouri Botanical Garden Arboretum. Bull. Gard. Club America

40[3]:54–55; (with Amy Gage): Introgressive Hybridization in *Phlox bifida*. Amer. Jour. Bot. 39:399–404; (with William L. Brown): The History of the Common Maize Varieties in the Corn Belt. Agric. Hist. 26:2–8; (with Hugh C. Cutler): Methods of Corn Popping and Their Historical Significance. Southwest. Jour. Anthropol. 6:303–308.

Henry N. Andrews, Paleobotanist to the Garden: Some American Petrified Calamitean Stems. Ann. Mo. Bot. Gard. 39:189–218; (with Charles J. Felix): The Gametophyte of *Cardiocarpus spinatus* Graham. Ann. Mo. Bot. Gard. 39:127–135; (with Sergius H. Mamay): A Brief Conspectus of American Coal Ball Studies. The Paleobotanist 1 (Birbal Sahni Memorial Volume): 66–72.

Martin Bagby, of the Arboretum staff: *Magnolia acuminata* as a Lawn Shade Tree. Mo. Bot. Gard. Bull. 40:43–44.

August P. Beilmann, Manager of the Arboretum: Floods as Seen as Signs of Land-Sickness. St. Louis Zool. Soc. Bull. 5[4]:4–5, 8; High-Speed Ecology and the Arborist. Arborist's News 17:85–88; Pollination and Conservation. American Bee Jour. 92:331–332; The River Bank Grape. Mo. Bot. Gard. Bull. 39:72–74; What Tree Shall I Plant? Trans. Acad. Sci. St. Louis 31[6]:1–24. 23 pls.; Why an Arboretum. Mo. Bot. Gard. Bull. 39:65–71.

Louis G. Brenner, Assistant Manager of the Arboretum: Forest Quadrat Studies at the Arboretum, and Observations on Forest Succession. Ann. Mo. Bot. Gard. 39:165–172; Native Food and Cover Plants for Quail. Mo. Quail Hunter 8:12–15. Winter issue; Salads for Quail. Mo. Bot. Gard. Bull. 40:165–166.

Ladislaus Cutak, Horticulturist in charge of Conservatories: Collecting Bromels in Mexico. Bromeliad Soc. Bull. 2:8–9. Jan.-Feb.; Spine Chats. Monthly feature in Cactus Jour. of Cactus & Succ. Soc. Amer.; They're All Sansevierias. Popular Gardening 3:28–29, 76–79. Feb.

Robert A. Dietz, Graduate Student in the Henry Shaw School of Botany: The Evolution of a Gravel Bar. Ann. Mo. Bot. Gard. 39:249–254; Variation in the Perfoliate Uvularias. Ann. Mo. Bot. Gard. 39:219–247

Charles J. Felix, Graduate Student in the Henry Shaw School of Botany: A study of the Arborescent Lycopods of southeastern Kansas. Ann. Mo. Bot. Gard. 39:263–286; (with Henry N. Andrews, Jr.): The Gametophyte of *Cardiocarpus spinatus* Graham. Ann. Mo. Bot. Gard. 39:127–135.

Paul A. Kohl, Floriculturist: The Angle-Pod *(Gonolobus laevis)*. Mo. Bot. Gard. Bull. 40:36–37.

Robert J. Gillespie, Jr., Graduate Student in the Henry Shaw School of Botany: A Basement Window Greenhouse. Mo. Bot. Gard. Bull. 40:41–43.

George A. McCue, Graduate Student in the Henry Shaw School of Botany: The History of the Use of the Tomato: An Annotated Bibliography. Ann. Mo. Bot. Gard. 39:289–348.

Gustav A. L. Mehlquist, Research Horticulturist: The Best Light and Temperature for African-Violets. Wisc. Hort. 42:224–225. (Reprinted from "Saintpaulias" in March 1952 Garden BULLETIN); Saintpaulias. Mo. Bot. Gard. Bull. 40:49–64; *Cymbidium erythrostylum* and *C. pumilum* as Progenitors of a New Class of Cymbidiums. Orchid Jour. 1:109–113; An Introduction to Cymbidium. Orchid Jour. 1:100–103. (Reprinted from "The Ancestors of Our Present-Day Cymbidiums" in May 1946 Garden BULLETIN).

Frederick G. Meyer, Dendrologist: London's Chelsea Physic Garden. Arboretum Bull. (Publ. Univ. Washington Arb. Fund) 15[2]:4–6, 30–33; Sumacs. Arboretum Bull. 15[3]:16–22.

George H. Pring, Superintendent of the Garden: Growing *Victoria Cruziana* from Seed. Mo. Bot. Gard. Bull. 40:85–89; Missouri Botanical Garden Report on Feeding. Orchid Digest 16:165–166. (Reprinted from June 1952 Garden BULLETIN); (with G. R. Lowry, Orchidologist): Further Experiments on Orchid Culture. Mo. Bot. Gard. Bull. 40:104–108.

Emanuel D. Rudolph, Graduate Student in the Henry Shaw School of Botany: More than a Tree Grows in Brooklyn. Bull. Torr. Bot. Club 79:329; Mushrooms in and out of the Herbarium. Mo. Bot. Gard. Bull. 40:167–169.

Julian A. Steyermark, Honorary Research Associate: Autumn Colors in 1952. Mo. Bot. Gard. Bull. 40:169–170; An Example of How Dams Destroy Valuable Scientific Records. Scientif. Month. 74:231–233; The Genus Platycarpon *(Rubiaceae)*. Amer. Jour. Bot. 30:418–423; A New Carex from Guatemala and Honduras. Ceiba 3[1]:23–24; New Missouri Plant Records (1949–1951). Rhodora 54:250–260; Rare Missouri Plants. I—Yellow Fringed Orchis, II—The Ozark Chestnut, III—Ozark Trillium. Mo. Bot. Gard. Bull. 40:39–41, 77–82; (with Ernest J. Palmer): New Pteridophyte Records from Missouri. Amer. Fern Jour. 42:61–66; (with Floyd A. Swink): Plants New to Illinois and to the Chicago Region. Rhodora 54:208–213.

Alice F. Tryon, Library Assistant: Rosmarein and Rosemary. Mo. Bot. Gard. Bull. 40:161–165.

Rolla M. Tryon, Jr., Assistant Curator of the Herbarium: A Newly Discovered Cache of Engelmanniana. Mo. Bot. Gard. Bull. 40:46; A Sketch of the History of Fern Classification. Ann. Mo. Bot. Gard. 39:255–262.

SCIENTIFIC AND POPULAR LECTURES.—

Edgar Anderson, Assistant Director of the Garden: a series of lectures at the University of Michigan, Ann Arbor—Jan. 9, before the ecology round table of the laboratory of human biology, "The Efficient Measurements of Specific and Racial Differences"; Jan. 10, University lecture series, "What is *Zea Mays?*", and before the botany graduate seminar, "The History of *Rosa alba*"; Jan. 19, Washington University Association lecture series, "What is a Species?"; Feb. 1, St. Louis Unit, Herb Society of America, "How Should We Study Herbs in St. Louis"; Feb. 16, Cosmopolitan Club, Washington University, and March 5, Christ Church Cathedral Luncheon Club, "Impressions of India"; March 18, Woman's Alliance, First Unitarian Church, "Understanding India"; April 17, Hispanic World Affairs seminar at Stanford University, Calif., "What is *Zea Mays?*"; April 28, biological sciences seminar, Stanford University, "How to Measure Species Difference"; May 15, California Botanical Society, "*Rosa alba,* the Rose of the Renaissance"; May 27, genetics seminar, University of California, Berkeley, "The Evolutionary Importance of Introgression"; June 14, Annual Phi Beta Kappa dinner, Stanford University, "Adventures in Chaos"; July 20, Franklin County Firefighters' Association, Gray Summit, Mo., "Impressions of India"; Oct. 16, Darling Lecture, Allegheny College, Meadville, Pa., "What is a Species and Why Bother?"; Nov. 12, National Academy of Sciences annual meeting, St. Louis, "The Ecology of Introgression in Adenostoma"; Dec. 2, Women's Association, Ladue Chapel, "Impressions of India"; Dec. 10, Southern Illinois University lecture series, Carbondale, "What is a Species and Why Bother?"; Dec. 15, University of Illinois, division of biological sciences lecture, Urbana, "Adventures in Chaos"; Dec. 16, botany seminar, University of Illinois, "Differences at the Species Level; Their Measurement and Significance"; Dec. 27, took part in panel on "Times Arrow and Evolution," of the Society of Systematic Zoology at the Amer. Assoc. Adv. Sci. meetings in St. Louis; Dec. 28, A.A.A.S. meetings, botanical sciences section, "Experimental Approaches to the Problems of the Species and the Problem of the Genus."

Henry N. Andrews, Paleobotanist: Nov. 10, Nat. Acad. Sci. annual meeting, St. Louis, "Recent Studies of Petrified Plants from the Central American Coal Fields."

August P. Beilmann, Manager of the Arboretum: Feb. 14, Midwestern Chapter, National Shade Tree Conference, Chicago, "High-Speed Ecology and the Arborist"; Feb. 22, Pine Tree Garden Club, "Planting and Care of Trees"; Feb. 28, Maplewood Christian Church, "The Conservancy District"; March 7, Washington, Mo., Garden Club, "Landscaping the Home Grounds"; March 15, University of Missouri, Columbia, "Beekeepers' short course, "Some Important Nectar and Pollen Plants"; June 26, Group 1, Webster Groves Garden Club, "Trees"; Oct. 15, Academy of Sciences of St. Louis, "Early Forests of Missouri."

Ladislaus Cutak, Horticulturist in charge of Conservatories: Jan. 13, before the Henry Shaw Cactus Society, Oct. 22, Ladies' Auxiliary, First Divine Science Church, Nov. 13, Shiloh Valley Garden Club, O'Fallon, Ill., and Civic Garden Club, Springfield, Ill., "Four Seasons in the Garden"; Jan. 22, The Dunkers, first annual reception to artists, "Floral Architecture"; Feb. 10, Henry Shaw Cactus Society, "Cacti and Succulents in the Missouri Botanical Garden"; Feb. 28, Circle B, Women's Association of Kirkwood Presbyterian Church, "Cacti and Succulents in Arrangement"; March 12, Ladies' Aid of the Evaneglical Children's Home, "Know Your Garden—Shaw's Garden"; March 26, Young Wives Club of the Carondelet Y.W.C.A., "Caring for House Plants"; May 11, Henry Shaw Cactus Society, "How to Graft Cactus"; May 27, Women's Association, Tyler Place Presbyterian Church, "Cacti, Succulents and Exotic Foliage Plants"; July 29, Tower Grove Kiwanis Club, "Highlights in the Missouri Botanical Garden"; Oct. 3, St. Louis Horticultural Society, "Exotic Plants for the Home."

Carroll W. Dodge, Mycologist: Feb. 11, Men's Garden Club of Webster Groves, "Molds in the Soil."

Paul A. Kohl, Floriculturist: April 15, Women's Auxiliary to the National Postal Transport Association, "Roses"; April 24, Greater St. Louis Hills Home Owners' Association, "Gardening in St. Louis Hills"; June 6, St. Louis Horticultural Society, and June 24, Green Thumb Garden Club of Brentwood, "Roses."

Gustav A. L. Mehlquist, Research Horticulturist: Jan. 17, Texas State College for Women, Denton, Texas, "New Trends in Horticulture."

Fred G. Meyer, Dendrologist: Jan. 9, before the Shrewsbury Garden Club, and Feb. 4, Tree Lovers Group, at the First Unitarian Church, "Kew Gardens"; March 31, Professional Women's Club, Kingshighway Presbyterian Church, and May 11, Women's Association of Giddings-Boyle Presbyterian Church, "Four Seasons at the Garden"; Oct. 15, Heather Garden Club of the Southwestern Bell Telephone Co., "Gardenia Culture, and Winter Maintenance of the Garden."

George H. Pring, Superintendent: Jan. 4, before St. Louis Horticultural Society, "European Gardens"; Jan. 30, American Heating and Ventilation Association, "Mr. Shaw's Garden"; Feb. 28, Men's Club of Tyler Place Presbyterian Church, "With the Prings in Europe"; March 6, Bob Goddard Show at Congress Hotel, Station, KXLW, "Mr. Shaw's Garden"; March 8, Station WLAC, Nashville, Tenn., "Orchids"; March 10, Landscape and Nurserymen's Assn., April 1, St. Clair County Garden Club, East St. Louis, Ill., April 15, Men's Council of St. Peter's Memorial Presbyterian Church, and April 17, St. Louis Florists' Club, "European Gardens"; May 8, faculty seminar, St. Louis University School of Medicine, "Development of Orchids from Seed to Flowering Plants"; May 9, Orchid Society of Greater St. Louis, "Orchids—Seeds to Flower"; May 12, Webster Groves Garden Club, "Judging Gardens and Plants"; May 19, convention of American Iris Society, at Hotel Chase, "Mr. Shaw's Garden"; June 16, Webster Groves Men's Garden Club, "European Gardens"; Oct. 3, Station WEW, St. Louis University, Oct. 5, over television, Station KSD, and Oct. 7, over NBC hook-up at the Veiled Prophet's Ball, St. Louis Municipal Auditorium, "The Queen's Bouquet"; Oct. 14, Bible Class, Christ Church Cathedral, Oct. 28, Normandy Kiwanis Club, and Nov. 2, Methodist Church, Kirkwood, Mo., "European Gardens."

Robert E. Woodson, Jr., Curator of the Herbarium: Nov. 12, National Academy of Science annual meeting, St. Louis, "A Biometric Analysis of Natural Selection in *Asclepias tuberosa*."

HERBARIUM

During the past year 15,887 specimens were mounted and inserted in the herbarium, bringing the estimated total to 1,632,908 sheets. Within the same period 9,481 specimens were accessioned for future mounting and insertion, of which 8,456 were received through exchange with other botanical establishments and 1,025 by gift. Continuing the trend of recent years, Africa was the largest single source of herbarium specimens accessioned, with a total of 5,234 sheets. Our African section is rapidly becoming not only an excellent reference collection, but a research collection as well.

A very time-consuming but necessary function of an herbarium such as ours is concerned with the lending and borrowing of specimens with other herbaria. During 1952 a total of 8,014 herbarium specimens was lent to 21 domestic and 4 foreign herbaria. On the other hand, for the use of our students and staff a total of 12,955 specimens were borrowed from 12 domestic and 8 foreign herbaria. This illustrates succinctly the research activity of our herbarium and our necessary dependence upon the facilities of our sister museums.

A total of 4,666 specimens were distributed from our herbarium in continuance of exchanges with others.

The administration of a major herbarium by four staff members—all on a part-time basis and with only the most incidental and irregular clerical and stenographic help—frequently is a very discouraging occupation. Thanks to the apparently indomitable Missouri Botanical Garden morale, we feel that our herbarium is continuing to increase in stature and usefulness, far beyond its material resources.

LIBRARY

Fewer books and pamphlets were catalogued in 1952 than in recent years, but the ones accessioned were important because many of them were rare or else completed a serial run. As a matter of fact, the library is not so much in need of books as of funds to keep up the excellent collections we already have. Recently a botanist who had done a great deal of bibliographical work in various libraries wrote us: "The more I see of various pre-Linnean collections (I saw a magnificent one last week) the more I am impressed with the Mo. Bot. Gard.'s. Unfortunately, I am also depressed by the condition into which they are falling." This condition was no news to us, and unless something is done shortly all our early botanical works will have so deteriorated as to be beyond repair. The library staff has done everything possible, with the limited time and material available, to save them, and during the summer they treated about 600 books, using a plastic glue for weak bindings and a transparent adhesive for torn and cracked pages. The volumes so treated were put in a more usable state, at least temporarily, and if the treatment proves to be enduring it will be used on other volumes. However, what most of the books need is rehabilitation by a professional bookbinder specializing in old books.

As an indication of the completeness of the Garden library for research, only 38 publications were borrowed from other institutions for the use of the Garden staff and students, while 259 interlibrary loans were made to 43 institutions during the year. The loans varied from a popular pamphlet on herbs borrowed by the St. Louis Art Museum to a technical publication borrowed by the Institute for Nuclear Studies, at Oak Ridge, Tenn.

In September Dr. Alice Tryon was appointed to the library staff. Having done most of the bibliographic work on her doctor's thesis in the Garden library, she was already familiar with botanical references. In addition to having charge of interlibrary loans, she has inventoried and recatalogued the publications of Italian botanical gardens.

New Accessions.—Probably the most important purchases during the year were the completing volumes or parts of five serials. All of these were purchased through foreign catalogues, but missing volumes of an equally important publication—Vols. 1–9 of *Physis* (Revista de la Asociacion Argentina de Ciencias Naturales)—were obtained in exchange for duplicate herbarium specimens and duplicate volumes of a Dutch serial. A future exchange of *Physis* with our ANNALS was also assured.

Publications received in 1952 other than those found in most libraries were the following: Gunnerus, J. E., Flora Norvegica. Pars I & II (1766–1772); Luckhoff, C. A., The Stapeliae of southern Africa; Motyka, J. L., Lichenum Generis Usnea studium monographicum, 2 vols. (1936–46);

Reise der Oesterreichischen Frigatte "Navarra" um die Erde. 3 vols.; Ochse, J. J., Fruits and Fruit-culture (1931); Trochain, J., Contribution à l'étude de la vegetacion du Senegal (1940); Velenosky, J., Novitates mycologicae novissimae (1947), and Species novae Basidiomycetum (1947); Wallich, N., Tentamen florae Nepalensis illustratae. Pt. 1 (1824).

Photostatic reproductions were made of several unobtainable botanical classics, among which was Jacquin's "Enumeratio systematica plantarum quas in insulis Caribbaeis vicinaque America" (1762). A microfilm of Vol. IV of Ruiz & Pavon's "Flora Peruviana" (1802) was also purchased.

Garden Publications.—Most of the work connected with issuing the two Garden publications, the monthly BULLETIN and the quarterly ANNALS, is done in the library. The librarian prepares the manuscripts for the printer, proofreads them, compiles the indexes, and does the secretarial work relative to publication, while Miss Ida Kohl, a library assistant, has charge of the subscriptions and exchanges. Volume XXXIX of the quarterly ANNALS, which was issued during the year, contains four doctors' theses and one master's thesis, the other papers constituting the results of the investigations by members of the staff in the Henry Shaw School of Botany.

More than half of the ANNALS issued are sent to other scientific institutions in exchange for their publications, many valuable journals being received thereby. The foreign exchanges are sent through the International Exchange Service of the Smithsonian Institution in Washington, which ships them to their destinations free of charge. Many of the BULLETINS are sent gratis to the "Friends of the Garden," some are exchanged for other horticultural publications, and some are sold on subscription or as separate numbers. The cash receipts during the year for all the Garden publications, including post-cards, were $5,845.25.

Visitors.—Among the out-of-town consultants of the library and herbarium during the year were the following:

Dr. Leon Croizat, of the Universidad de los Andes, Merida, Venezuela; Dr. Jose Cautrecasas, of the Chicago Museum of Natural History; Dr. Pierre Dansereau, of University of Michigan, Ann Arbor; Dr. Robert A. Dietz, of University of Tennessee, Knoxville; Dr. W. H. Emig, of University of Pittsburgh; Dr. Norman Fassett, of University of Wisconsin, Madison; Dr. Raymond Fosberg, of George Washington University, Washington, D. C.; Dr. George J. Goodman, of University of Oklahoma, Norman; Dr. John J. Finan, of the Institute of American Affairs, State Department, Washington, D. C.; Dr. Alexander Grobmann, of the Escuela Agricola Nacional "La Molina," Lima, Peru; Dr. Charles B. Heiser, of Indiana University, Bloomington; Dr. Hugh H. Iltis, of University of Arkansas, Fayetteville; Mrs. Ida K. Langman, of the Academy of Natural Sciences, Philadelphia; Dr. H. de Lazslo, of the Royal Institution, London, England; Dr. W. R. McAtee, of Chapel Hill, N. C.; Miss Eleanor McGuilliard, of the University of Chattanooga, Tenn.; Dr. Rogers McVaugh, of University of Michigan; Dr. John Adam Moore, of Louisiana Polytechnic Institute, Ruston; Dr. Balaji Mundkur, of Southern Illinois University, Carbondale; Dr. David J. Rogers, of Allegheny College, Meadville, Penn.; Dr. Lloyd H. Shinners, of Southern Methodist University, Dallas, Texas; Dr. A. J. Sharp, of University of Tennessee, Knoxville; Mr. E. E. Stanford,

of the College of the Pacific, Stockton, Calif.; Dr. H. K. Svenson, of American Museum of Natural History, New York; Dr. Delbert Swartz, of University of Arkansas, Fayetteville; Mr. H. A. Steavenson, of the U. S. Soil Conservation Service, Elsberry, Mo.; Dr. Paul Weatherwax, of Indiana University, Bloomington.

Statistical Information.—There have been donated to the library or received in exchange for our publications during the year: 573 books valued at $2,293.09; 1,337 pamphlets valued at $427.90; 5 maps valued at $4.75. The purchases consisted of 189 books at a cost of $1,299.34, and 58 pamphlets or parts of volumes at a cost of $133.57. One set of micro-cards was purchased, 1 micro-film, and 3 books were photostated.

The library now contains 61,582 books and 107,413 pamphlets, and 553 manuscripts. The number of index cards now totals 1,339,084, of which 5,107 were added during the year, 880 having been written by Garden employees. During the year 122 books were bound, and 600 were repaired by the library assistants.

ANNUAL BEQUESTS

The annual flower sermon, "On the goodness of God as shown in the growth of flowers, fruits, and other products of the vegetable kingdom," provided for in the will of Henry Shaw, was preached at Christ Church Cathedral, on Sunday, May 22, by the Rt. Rev. Arthur C. Lichtenberger, Bishop Coadjutor of the Diocese of Missouri.

The Gardeners' Banquet Fund was used to provide turkeys for the employees at Christmas.

ATTENDANCE FOR 1952

(Not including visitors to Arboretum)

	Week-days	*Sundays*
January	2,876	6,481
February	5,352	9,506
March	3,534	5,428
April	9,331	16,734
May	15,610	11,704
June	9,950	16,754
July	11,425	6,778
August	16,424	10,765
September	16,780	6,632
October	10,119	8,642
November	10,059	25,610
December	4,954	8,022
	116,414	133,056
		116,414
	Total	249,470

Respectively submitted,

GEORGE T. MOORE, *Director.*

THE MISSOURI BOTANICAL GARDEN

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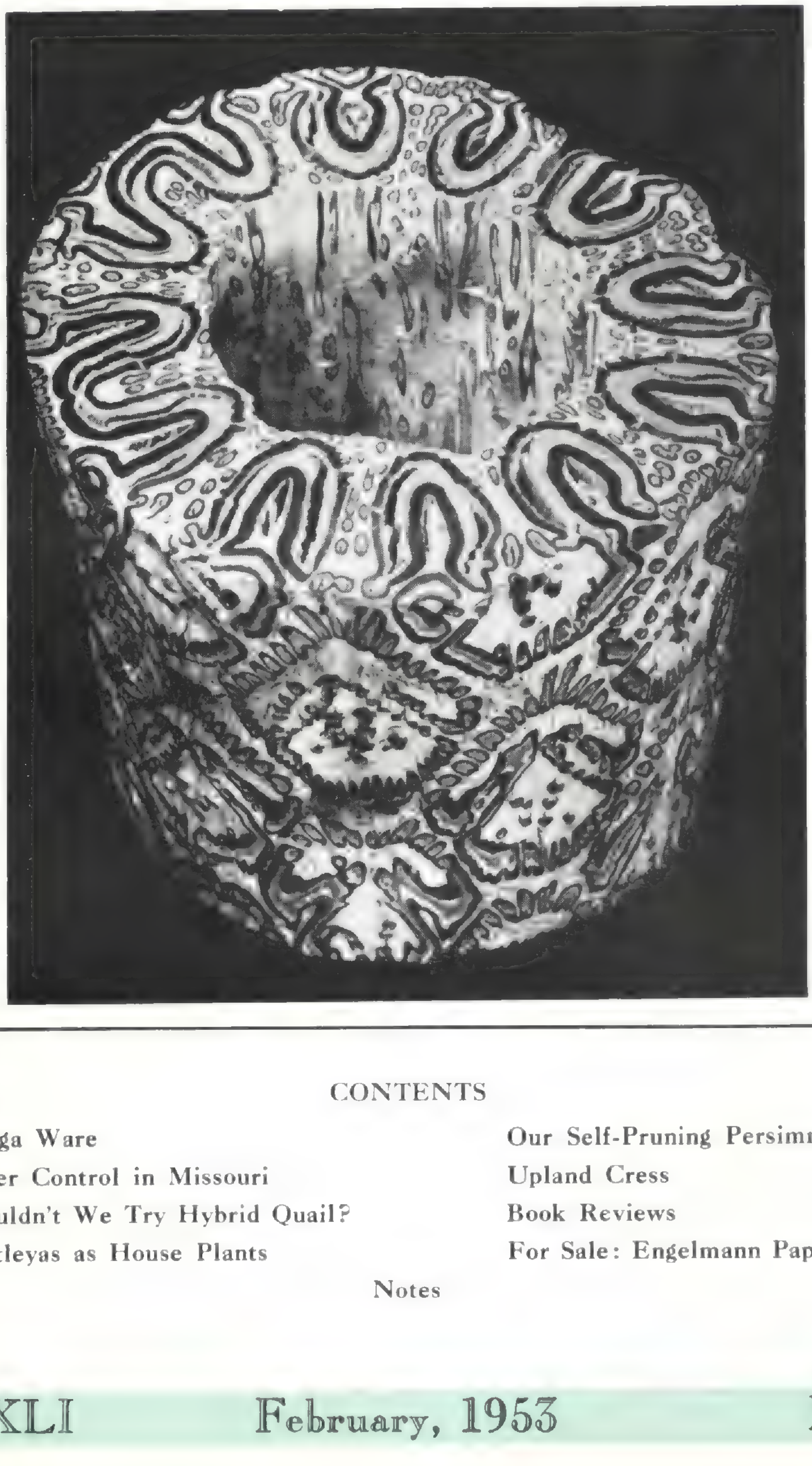
SOME FACTS ABOUT THE GARDEN

The Missouri Botanical Garden was opened to the public by Mr. Henry Shaw about 1860. From that date until his death in 1889 it was maintained under his personal direction. Although popularly known as "Shaw's Garden" the name Missouri Botanical Garden was chosen by Mr. Shaw and he definitely indicated that he wished it called by that name. The Garden passed at his death into the hands of a Board of Trustees, designated in Mr. Shaw's will, and the Board so constituted, exclusive of certain ex-officio members, is self-perpetuating. By a further provision of the will the immediate direction of the Garden is vested in a Director, appointed by the Board. The Garden receives no support from city or state but is maintained almost exclusively from the estate left by Henry Shaw. Since 1939 many Garden Clubs and interested individuals have contributed to a "Friends of the Garden Fund" which is used in developing the new Arboretum, located at Gray Summit, Mo. The Arboretum (1) serves as a source of plants, trees and shrubs for the city Garden; (2) affords areas for gradually establishing a pinetum, a wild-flower reservation and various other features on a scale not possible in the city; (3) provides greenhouses for some 50,000 orchid plants.

The city Garden comprises 75 acres, where about 12,000 species of plants are grown, both out of doors and under glass. It is open every day in the year except New Year's Day and Christmas; week days, 8:00 a. m. until 7:00 p. m.; Sundays, 10:00 a. m. until 7:00 p. m. The greenhouses are closed every day at 5:00 p. m.

The main entrance to the Garden is at Tower Grove and Flora Place, on the Sarah bus line (No. 42). The Southampton buses (No. 80), direct from downtown, pass within three blocks of the main entrance.

MISSOURI BOTANICAL GARDEN BULLETIN



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COVER: Prepared stem of Black Ponga (New Zealand Tree Fern).

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Missouri Botanical Garden Bulletin

Vol. XLI FEBRUARY, 1953 No. 2

PONGA WARE

ROBERT COOPER

The cover photograph shows a short length of the stem of a New Zealand tree fern, *Cyathea medullaris* Sw. The trunk of the tree fern is usually covered with matted fibers in the lower part, and marked higher up with the scars of fallen fronds and the bases of old fronds. In the specimen illustrated the fibers have been cut away exposing the vascular supply to the leaves and roots, and the central pith has been removed. The specimen was sent to the Missouri Botanical Garden by Mr. H. J. Dentzman of St. Louis, who received it from Mr. G. L. Miller of Te Awamutu, New Zealand.

Quite handsome pots and garden ornaments are made from the whole trunk which may attain a diameter of two feet or more at the base. Turning these is dirty work, however, and very hard on the tools. The broken fibers are very popular in orchid culture. The whole trunks are used for garden paths, holding banks, garden drain-pipes, ornamental fences and fern-houses. New shoots may arise from the cut stems and add to the beauty of the structure.

Stems which have been cleaned and bleached are made into vases, powder-bowls, and ash-trays. One of my associates on making inquiries found that *Cyathea medullaris* is the species used. Turning must be done while the trunk is still green. The soft central pith is then scraped out and the article is left to cure (the white ground tissue shrinks away from the hard black masses of fibers). Methods of curing and bleaching are carefully guarded trade secrets. The dried stem will not hold water so an iron or glass container is fitted in the center. Usually the outer surface is polished and varnished, and the finished vase, ash-tray, or powder-bowl sells for two to three dollars or more. Unfortunately, there seems to be only one manufacturer, and as he had not been to town for some time my associate was unable to send me any specimens of his wares.

Cyathea medullaris, better known perhaps as the Black Tree Fern, Black Ponga, or Mamaku, is one of the largest and most imposing of the tree ferns. Its trunk reaches 50 or more feet in height, bearing a crown of spreading

fronds at times as much as 20 feet long. The strong, bright green leaves are borne on glistening black stalks. Dobbie, an ardent New Zealand pteridologist and author of a very popular book on New Zealand ferns, found the average daily growth of the fronds to be 2 inches, and the greatest daily growth to be 4 inches. He considered that the stems did not grow more than a foot in height each year.

The first European botanists to collect specimens of this tree fern were John Reinhold Forster and his son George Forster, who accompanied Captain James Cook on his second voyage to the South Seas in the years 1772–1775. The plant was described in 1786 as *Polypodium medullare* by George Forster in an attractive little book entitled "De Plantis Esculentis Insularum Oceani Australis Commentatio Botanica" in which details of 54 edible plants are given. Forster applied the specific name "medullare" in reference to the fact that the pith tissues of the stem consist of a mealy substance, resembling sago, which was used by the Maori for food. It was quite palatable, after being cooked in an oven, and possibly took the place of potatoes when roasted slave or enemy was served as the main dish. The aborigines of southeast Australia also used the pith of *C. medullaris* for food, and the natives of New Caledonia ate the pith of an allied species, *C. Vieillardii* Mett.

THE WATERSHED DISTRICT AS AN APPROACH TO RIVER VALLEY DEVELOPMENT IN MISSOURI

AUGUST P. BEILMANN

(The following paper was presented before the Missouri State Chamber of Commerce by August P. Beilmann, Manager of the Missouri Botanical Garden Arboretum. Though various other members of the Garden staff are in complete sympathy with Mr. Beilmann's point of view, publishing the paper does not in any way commit the BULLETIN or the Missouri Botanical Garden as having publicly endorsed his position. It is rather that as a public service we are giving wider currency to the personal opinion of the member of the staff most qualified to have an informed opinion on this controversial subject.)

We feel that any approach to more river work, under any guise, must be realistic. Nationally we can no longer afford the luxury of building dams just because some bureau, aided and abetted by local balloon peddlers, feels that it has found a location where its authority will not be questioned or challenged. To-day none of us are free of the tax load, no little part of which goes to pay for these grandiose schemes. Neither can we, as a nation, afford the luxury of destroying our resources.

After considerable study, the Agricultural Committee of the St. Louis Chamber of Commerce, in 1946, opposed the construction of high dams. They were influenced by a letter from State Geologist, Dr. Edward L. Clark,

who wrote: ". . . there is no question but what high dams will inundate mineral deposits . . . the Osceola Dam will inundate many acres of land which should produce coal at some future date." He also wrote "that it was difficult to determine the damage which will be done by dams on the Meramec River." He then pointed out that we are now mining minerals considered too low in value 25 years ago and that "no one can predict what grade ore will be mined in the next 25 years."

Can we as Missourians, as Americans, and as taxpayers afford the luxury of such a wanton destruction of our resources? Dr. Clark referred only to the minerals; but since over 10 per cent of our bottomland would be flooded by the proposals for damming our rivers, can Missouri throw away over a million acres of her best farm land? Can we multiply this by 48 (the number of states) and still remain well fed—and feed the rest of the world besides? And there is a proposal to dam every river in the country. That was Harry Truman's statement to the delegation of ladies from Blue Valley when they called on him at Kansas City to protest the construction of Tuttle Creek Dam. He told them that there was no need to protest since "they" were going down every river valley in the country.

Then there is the little matter of human rights and dignity. We seem to be in a dither to ferret out and correct abuses of human rights wherever they may be found throughout the world. But what of the good people we dispossess in our own river valleys? They are the folks who made America; it was their industry that permitted the creation of the very bureaus whose objectives seem aimed at the destruction of their creators. If you think this reference to a bureaucratic Frankenstein is too blunt then read the report of the Missouri Division of Resources and Development, an agency which studied the effects of Wapapello on the people and the country during and after the completion of that dam. They point out that only in the condemnation proceedings is there any attempt to hold down costs. During that stage of the game the finest talent is brought in to see that there is no overpayment for confiscated property. No compensation is made for the year or years which might elapse before a farmer or business-man can re-establish himself and again earn a living. No consideration is made for inflated markets when many people are uprooted and forced to acquire new farms and new business sites. But after the upheaval and confiscation the ugly head of economy will never again be seen; then it becomes a race to see how grand and costly a scheme can be evolved.

As you probably know, the "high-dammers" have kept abreast of the times. The first river work was designed to aid navigation. This began in 1826 when Mr. Shreve (later Colonel Shreve) built special boats designed to remove snags from the Ohio, Mississippi, and Red rivers. In the days of limited transportation this was as sound as was the work on inland harbors.

A good deal later navigation locks and dams were constructed, the stairway of 26 locks and dams between St. Louis and St. Paul being an example. But with improved overland transportation the public finally caught on—after spending a thousand million dollars! Then the same bureaucrats discovered the immense popularity of "flood control." This shotgun wedding of navigation and flood control had its inception in human misery. Not once has it failed to capitalize on such misery, and not once has it alleviated a single bit of it. Eventually this "flood control" got to be a little difficult to swallow. When the figures were examined and the bombastic claims reviewed there was no control of floods and still less navigation. Then recreational facilities and even benefits to wildlife were included—both sound and necessary developments until these proposals were examined.

As the old reasons wear out new ones must be found to justify the continual manipulation of our rivers. And to our dismay we find that the dam-builders have just uncovered one of their greatest allies—electric power. They now propose to install a turbine in each dam. This is part and parcel of every project in Missouri even if the stream is so small that at times it has no flow! Just mention hydroelectricity and all the little REA managers grab a few chosen farmers, hop a train, and appear at the hearings in Washington. Even the past administration has fronted for them as in the case of Table Rock, where a dam in Missouri was to be a source of power all of which was to be available for a private corporation located across the state line in Arkansas.

I have indicated that the river program as it has been carried on, first under one name and purpose and then under another, has been a glorious bit of "boondoggling" that we as taxpayers and all of us as Americans can ill afford. It may not be necessary to cite the report, the paragraph, and the page to prove how ill advised many of the projects have been—you may be well aware of that. Here are a few samples. In 1930 General Brown of the U. S. Corps of Engineers estimated that $50,000.00 would cover the damages chargeable to floods in the Meramec River; 19 years later they proposed to spend over 45 millions for "flood control" and related "benefits" in that same river system! Wapapello, completed in 1940, has been such a dismal failure in doing the very thing it was engineered for that the downstream farmers have petitioned its removal. Partly to correct the errors in that comedy of errors, the Corps of Engineers has installed two immense pumps to take water from the "protected" fields and put it back into the river!

At public hearings the Corps of Engineers is often paid homage to as "the greatest body of engineers in the world." But it has erred so mightily in its chosen field that the Kerr Committee, investigating the Civil Works program, pointed out that through "engineering errors" certain projects had

cost 502 per cent over estimates! The record is very much longer, and I might cite a great many more instances. All are very much alike and all show the same disregard for democratic principles and for the people who are in the way. On the basis of that record, it would be national suicide to allow any bureau to treat all our watersheds. There is no faster way of destroying our irreplaceable resources and reducing the acreage which must continue to produce more and more food.

If we are sincerely interested in controlling floods without destroying ourselves as a nation, if we would alleviate the human misery which is the aftermath of floods without destroying the agricultural and mineral resources upon which all of us depend, if preservation and not ruination is our goal—then there is another solution. The treatment of a river valley as a "watershed district" for the control of floods, for a sound agriculture, for recreation, and for the common good is not the visionary dream of an idealist. It has been thoroughly tried in Ohio as the Muskingum Water Conservancy District; in Oklahoma, as the Washita Valley Agricultural Flood Control Project; in Missouri, on Brush Creek—a little flood-control laboratory near Gray Summit. This is the democratic way: The project begins with the circuit courts having jurisdiction in that valley. They appoint a Board of Governors; elections are held; the proposed work must be justified, must be paid for, and any mistakes lie on the doorstep of the officers who are residents of the valley. In short, they must live with their plans and thus become accountable for mistakes. This is the very antithesis of the present river program where a bureaucrat a thousand miles away makes a decision, gets his name cast in bronze on a concrete monument and moves on to greater achievements. The bureaucrat is accountable to no one except his own vanity. The Watershed District officers are required to account for their program before their neighbors!

Snowdrops transplant best if they are moved when in full flower. The practical consequence of this fact is that the only really effective way to get a good clump started quickly in one's garden is to get the plants from some friend who has them doing well in his garden. This in turn means that snowdrops tend to be restricted to the gardens of people who are not only good gardeners but who have plenty of friends. Somehow this seems peculiarly appropriate for such a brave and graceful little plant.

The open winter has brought more birds in the Garden than usual. Two robins have been feeding in the Garden all winter and were joined in January by a small flock. A white-throat sparrow has come to one of the feeding stations every day, and a mocking bird and a song sparrow have been seen occasionally.

SHOULDN'T WE TRY HYBRID QUAIL ALONG WITH HYBRID CORN?

AUGUST P. BEILMANN

During the past decade we have witnessed a tremendous increase in the productivity of our agricultural lands—an increase that has exceeded the fondest hopes of those concerned with the food supply of our country. When we recall that warnings of a rising population and a dwindling food supply were issued long ago and that the solution then seemed far away, the recent gigantic increase of food per acre is very comforting. Of course, the very favorable market has been helpful; farmers have done everything possible to make money, and the government has virtually guaranteed a satisfactory market for all that could be produced. However, the lure of making money would not have accomplished the result we have observed. Machinery which stretched the labor of a man helped, but few farmers were able to double the acreage of their operations. What then was responsible for the phenomenal increase of food production per acre? No small measure is due to improved strains and varieties of nearly all farm crops. The national average production of corn per acre is about 40 bushels, but no "corn contest" entrant has a chance unless his yield is almost four times as great. The "impossible" goal of 200 bushels per acre has been achieved, and the sights have been set for 300 bushels! The increased yield is not restricted to just one crop; nearly every product has undergone the same transformation —even chickens and turkeys!

Why do we now get so much more per acre? Aside from other contributing factors, the increase is due primarily to the fact that these crops have now been tailored and stream-lined for increased productivity. You no longer just plant soybeans—you now plant a specific kind suitable for the region and the soil on which you hope to grow it. No one just plants a corn crop. He plants a particular variety which has been bred for a specific territory. In fact, the most successful corn-grower might give as much thought to the ancestry of a variety as any cattle-breeder gives to the blood lines of his herd sire. The recent improvement of the castor bean, one of the most dramatic and least publicized crop stories, demonstrates what can be done. In the 1880's castor beans were a cash crop in some parts of Oklahoma, Kansas, and Missouri. Other more profitable and less labor-consuming crops forced it out of the picture. But modern industry had become so dependent on importations of castor oil that a crisis developed when imports were shut off during World War II. The shortage became so serious that tremendous sums of money were spent and heroic efforts made to grow the plant on the farms from which it had disappeared. Under the impetus en-

gendered by need, the problem was placed in the hands of plantsmen who, after searching the world for seed sources, began to select and hybridize. To-day the castor bean is again a cash crop in Oklahoma and Kansas. To accomplish this the plant had to be tailored to fit modern American agriculture, and machinery had to be devised to fit its peculiar requirements. In about ten years a lost crop was found, tailored by selection and hybridizing, and put back on the farm!

What has all this to do with quail? Just this—if breeding and selection can so successfully solve problems of food and industrial oils, why should it not be tried with our game birds? One might point to the growth of the broiler business, the development of apartment-sized turkeys, the production-line raising of pheasants and even ducks. It is admitted that all of these birds are being raised for the butcher and not for the gunner. However, even quail are relatively (?) easy to grow after brood stock is selected through several generations. But the basic principles remain the same—we can grow finer hybrid corn, special kinds of turkeys, not just hogs but "bacon" pigs, and cattle with little resemblance to their ancestors when imported half a century ago.

In the anticipation that superior qualities could be fixed after sufficient experimental work had been done, what would be needed to begin the selection and finally the hybridizing of quail? Could we look toward producing a bird equally as sporting as any we know now—one quite prolific, perhaps longer-lived and exhibiting outstanding adaptability, a variety able to thrive in the narrowed range following intense farming and able to hold its own in congested districts? Perhaps we are looking for a paragon among quail—but paragons have been developed in our farm crops, our poultry, and our cattle. Why not spend some effort on this problem? The alternative is additional restrictions and reduced bag limits.

The first step in any breeding program is locating a homogenous species, one whose transmissible characters appear "fixed." Often such fixation is accomplished only after many generations of inbreeding, and results are predictable only when traits are firmly "fixed." This might seem an insurmountable obstacle, but it is not. Scattered through the Middle West are some quail populations whose range has become so restricted that they have become "inbreds" to the point where they may be said to be a special race. One such population can be found within the stone wall of the Garden. Here on an "oasis" of less than 75 acres a quail range has been formed through the growth of the city. Once the birds raised in the Garden might have moved outside during the usual fall covey "shuffle," but for the past twenty-five years they have had no opportunity to mix with other birds;

they are a race apart, an inbred line. This has certainly happened in other large cities and perhaps even in smaller towns where the buildings and the topography have combined to isolate a few coveys and prevent their mixing with other quail. These are the "inbreds" which might become the foundation of a quail-breeding program. A few individuals from each locality should be trapped and mated to birds of similar background from other areas, or even to pen-reared birds. The extent and the mechanics of a breeding program will depend upon the number of birds available through trapping and the number of isolated coveys which can be found.

Until sufficient experimental work has been done we cannot tell if there has been a segregation of transmissible characters of value in a quail-breeding program. But isolated coveys that can successfully maintain themselves through twenty-five generations might be expected to have the adaptability needed by all quail to-day. Those birds, bringing off a brood within inches of a busy walk and whose feeding hours are sharply curtailed by passing traffic, would seem to furnish ample proof of rapid adjustment to environment. Cover restoration, through plantings of lespedeza and multiflora roses, is certainly of great value to those quail that remain in a particular locality. But, since we shall not be able to turn the clock back a half-century to the cover and endless birds of that time—shouldn't we try a hybrid quail?

CATTLEYAS MAKE EXCELLENT HOUSE PLANTS[1]

JOHN NEWTON SCATCHERD

I wonder why it is that people make such a "Federal case" out of attempts to grow orchids as house plants. It can and is being done without too much trouble. As I write this, I can see my plants sitting on my bedroom window-sill and growing strongly, some with two growths on single-lead plants. And I am no expert, only a "determined amateur" with about a year and a half of experience in raising the "Queen of Flowers."

Since I live in an apartment located in a suburb of St. Louis, I naturally have "ideal" conditions for Cattleya growing:

(1) Relative humidity of from 2 to 30 per cent. (My gauge shows 8 per cent at present, which is about average.)

(2) Temperatures in the middle and upper nineties almost all this past summer, with several days over 100° F., dropping to between 75 and 85° at night. Commercial growers around here lost some valuable hybrids because of these terrific temperatures. I was lucky, I guess. Didn't lose any.

[1] After the special "Orchids-for-Amateurs" number of the BULLETIN had gone to press in November, one of the St. Louis amateur orchidologists turned in a most interesting article on Cattleyas as house plants. It has so much down-to-earth information for the average gardener that we are publishing it in this number.

(3) In the winter the temperature may go from 90° on a bright day down to 45° at night. We receive no heat after about nine o'clock in the evening. I usually move the plants away from the window on really cold nights.

(4) The plants being placed on a south window-sill in my bedroom, they are provided with bright sunshine from about 11 o'clock in the morning on. The window is about 3½ feet wide and 5 feet high, and has a vertical screen covering one-half of it.

I have eight mature Cattleya plants (two *C. Mossiae*, one *C. Trianae*, one *C. Bowringiana*, one *C. labiata*, one *C. Lueddemanniana*, one *Laeliocattleya* "C. W. Powell," and one unknown hybrid). As far as I am able to tell, none of them appear to be longing for the "conditions" most growers recommend for orchids. They look just as tough and green and healthy as any in a greenhouse, and the leaves and bulbs are of comparable size. Probably I shall never win a First Class Certificate or even a Vote of Thanks for my efforts, but I am having a great deal of fun proving to my own satisfaction that it is possible to grow and flower orchids on a window-sill.

So, if I may, I should like to list my recommendations for raising them at home:

(1) Give them all the sunlight you possibly can. This is exceedingly important. It is the only way to insure tough, thick, broad *leaves*, fat, sturdy *bulbs* and *flowers*. A screen is excellent protection against burning the leaves. Oddly enough, my worst burning problem comes in October and November. The lower angle of the sun at this time of the year causes it to shine more directly on the plants.

(2) Give them plenty of water, especially during active growth. Watch the roots and fiber closely and never let them dry out completely. You may have to water one or two of them every day. From those big leaves and that open fiber an amazing amount of water is evaporated. Keep on watering until the growth is matured (hardened). The leaf and bulb on a new Cattleya growth will be fairly soft and pliable until the growth decides it's finished; then suddenly the leaf becomes as stiff and tough as a leather belt and the bulb almost as hard as a bone. If you have not supplied sufficient water up to this point, you are going to end up with a miserably small bulb. After the growth hardens, it's too late. Of course, it is always possible that a plant will break a new "eye" from the hardening growth and keep right on growing. If this happens, you will have to continue watering as before. If not, just give the plant enough water to keep it from shrivelling—probably a light watering once or twice a week until the plant blooms.

(3) Feed them occasionally while they are in active growth. (I use one-half teaspoon of "Hyponex" to a gallon of water.) This feeding enables

them to take more direct sunlight without burning, gives them more vigor to withstand the home conditions, and helps make each new growth larger than the one before. I am also experimenting with an organic fertilizer. It is a sort of "beer" made by steeping shredded oak leaves in water. Place about 16–20 oak leaves in an open jar filled with a gallon of water; let stand for about three days; then strain off the liquid and apply it to the plants. Its effect on seedlings is remarkable!

(4) Generally speaking, I find spraying to be a waste of time and effort. One can soak the leaves on a warm day and five minutes later they will be bone-dry. Obviously, anyone who works for a living cannot keep up with this all day long, so I dispensed with it almost entirely. Adequate watering will take care of the plants' needs. If the bulbs shrivel a bit on a hot day, they will fill up again on a cloudy or cooler one. Again I say, watch the plants! Study them closely and learn their individual growth habits; and occasionally wipe the dust off the leaves with a damp cloth. They seem to like it.

(5) I think a generous sprinkling of patience helps a great deal. Orchids are slow growers at best, and the difference in the amount of light they receive in a home where there is only "side" light as compared to that in a greenhouse which has "all-over" light sometimes makes a difference of as much as two months in the blooming time of a particular plant. One of my plants, *C. Mossiae,* flowered in early April when I first bought it, and the next year it did not flower until the middle of June.

(6) Last, but not least, it is very important to select strong-growing, free-flowering, mature plants for one's window-sill efforts. *C. Mossiae* and *C. Trianae* (large variety) are probably the most reliable, the toughest, the cheapest and among the prettiest. The beginner may tinker with them almost to his heart's content and they will not become too annoyed. I divided *C. Mossiae* in April when I thought it was not going to bloom. As mentioned above, it bloomed in June anyway. Both the front and back bulbs have completed their new growth since then. Oddly enough, the back bulbs have done all their new growing on my living-room (north) window-sill where they get bright daylight but no direct sunlight.

In closing, I would like to say that one can go to all the orchid shows in the world and still not get the "little glimpse o'glory" that comes from seeing an orchid in bloom in one's own home. There is nothing in the average house to compare with the magnificent, iridescent coloring of these beautiful flowers. And with a little care and patience, you can have them, too.

OUR SELF-PRUNING PERSIMMON

HARRY R. SKALLERUP

During the winter, if anyone casts a second glance at a persimmon tree (*Diospyros virginiana* L.) he does so, perhaps, to spy its legendary marsupial companion, the possum. More than likely he will not see a little beast sitting in every persimmon tree, but assuredly on each tree, near the tips of coarse bare branches, a silhouette of feathery twigs will be seen. And upon the ground, more twigs—most of them two years old—reveal an interesting habit of the persimmon, namely, that it "prunes itself." From observations it was found that some of the lateral twigs are shed after the first year, most after the second, and some during succeeding years, while a very few remain to become the stark secondary branches of the tree. If the above "pruning" pattern were diagrammed, a four-year-old branch would appear somewhat as in fig. 1, with the feathery one-year-old twigs much in evidence. Figure 2, in contrast, shows how the same branch would look if "self-pruning" did not occur.

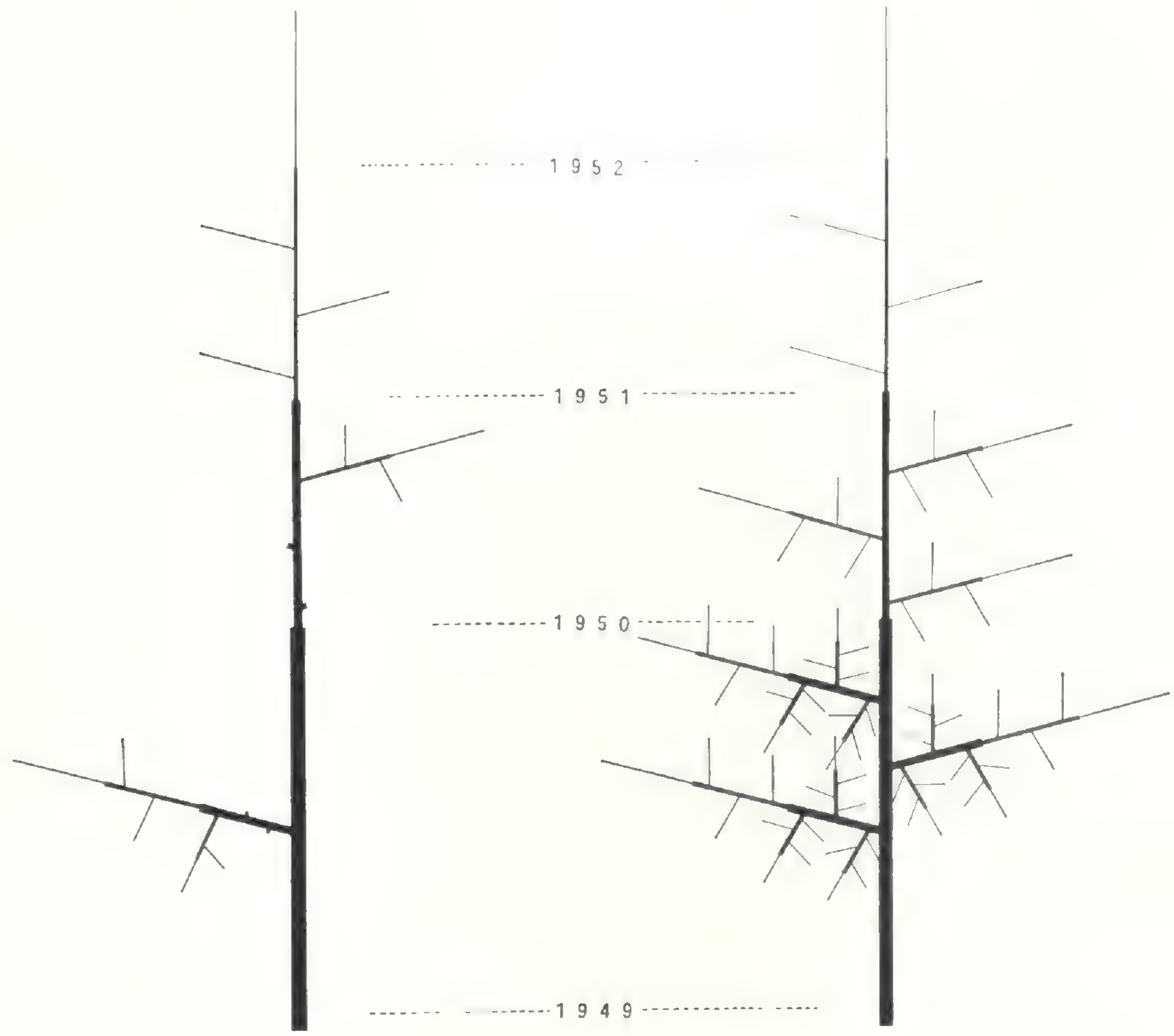

Fig. 1 Fig. 2

Other trees, such as poplars, some elms, and oaks, also eliminate their superfluous branches by pruning themselves. Commonly, the branches of these trees are dropped in a manner that is essentially the same as the way leaves are shed from a tree in autumn. At the joint or node of the branch and stem a structurally weaker layer of wood, which serves as the point of breakage, is formed early in the life of the branch. Depending upon the species of tree, the smaller branch may separate at this zone at any time from one to twenty years after its formation. After the branch drops, the scar it leaves on the stem is subsequently sealed over by the tissue that forms the bark of the tree. This phenomenon is known botanically as abscission, and the term is used to refer to the above type of shedding of leaves, branches, and the floral parts.

When the persimmon is planted as a fruit tree, its self-pruning nature reduces the amount of actual pruning and thinning necessary, and, together with lateness of growth in spring, practically assures a heavy crop of fruit.

UPLAND CRESS IN THE HOUSE AND IN THE VEGETABLE GARDEN

EDGAR ANDERSON

This is a good time of year to grow a little Upland Cress on the window-sill to add a fresh note to salads and sandwiches. Upland Cress is a weedy little plant in the mustard family which grows in ordinary garden soil but tastes almost exactly like water-cress. In England it is sprouted over water, and the sprouted seedlings are sold in bulk to be used in making thin bread-and-butter sandwiches. One of the simplest ways to grow it in the home is to fill a soup bowl half full of sphagnum moss or shredded paper towel or some such material, soak it with water, and then scatter the seeds on top. In ten days the bright green little seedlings will be two or three inches high and ready to harvest. One such bowl will make enough cress for about four sandwiches. The seeds can be purchased in small packets at any large seed store and are sometimes marketed in specialty shops under various trade names.

Though seldom grown in this country, Upland Cress makes a good salad plant for St. Louis vegetable gardens. It forms feathery tufts of foliage which can be used from the time they are a few inches high until they reach up to a foot or so and start to bloom. Upland Cress does not seem to mind our frequent spells of hot dry weather which are so devastating to many European salad plants. While it will not last until mid-summer it can, for several weeks, make a pleasant addition to tossed salads. If your garden is a small one, try sowing cress between the tomato plants just after they have been set out. It grows so quickly that it will be harvested and out of the way before the tomatoes are large enough to take up all the room in between.

BOOK REVIEWS.—

Philippine Orchids. By Reg S. Davis and Mona Lisa Steiner. 270 pp. William Frederick Press, 313 W. 35th Street, New York 1, N. Y. 1953. $5.00.

This comprehensive book by two orchid enthusiasts illustrates more than one hundred Philippine orchids. They were photographed in Manila when in bloom, many of them in Mrs. Steiner's own garden. There are short introductory chapters on the geography and the climates of the Philippines with a climate map and actual meteorological data for five localities. There is a chapter on the teratology of orchids, a short account of the introduced species most frequently met with in the Philippines, a glossary, and a comprehensive index. The illustrations are accompanied by short descriptions, notes on the history of each variety discussed, and remarks as to their behavior under cultivation, with advice as to potting media and watering schedules. As might be expected, a good portion of the book is given over to Dendrobium, Phalaenopsis, and Vanda but over forty other genera are illustrated. Any orchid enthusiast who is trying to grow these beautiful Philippine species will find that this volume comes as close to answering his most urgent questions as one might hope to do with so large a subject in less than 300 pages.—E. A.

Flora of Western Australia. Vol. I, part 1. Gramineae. By C. A. Gardner. 400 pp. Perth, 1952.

Some new books deserve a review because they are of very general interest; occasionally there appears a volume which almost demands attention for precisely the opposite reason. This monograph on the grasses of Western Australia is worth writing about because scarcely a single reader of the BULLETIN will want to own a copy. [Yet it is the kind of a book which makes one proud to be a human being; it is the kind of a book which it is the business of this BULLETIN to help its readers appreciate.]

Grasses are one of the chief natural resources of Western Australia and the country apparently appreciates the fact; at least the foreword to the volume is written by the Premier himself. Some hundreds of kinds of grasses are native there, and others have been introduced; 127 genera of them are recognized in this monograph. Yet it is no volume for the general public. If the essential facts with regard to Western Australia's grasses are to be distilled into one book, all discussion and description must be stripped to the bone. Grasses are a whole world in themselves; those who would understand them must master the simple but precise technical botanical shorthand which tells the most in the least space. Open the book at random. You will find some such phrase as "Spikelets gaping. Glumes subequal, acuminate, entire

or sub-dentate, the apices hyaline." This is the stuff the book is made of, technical descriptions, technical keys, over 100 simple line drawings diagramming the most important species, an occasional phrase or two about the importance or interest of a particular grass.

It is dry, distilled scholarship. The author has been a field botanist for the Western Australian government for thirty years. He has himself collected many of the facts on which his monograph is based. He has himself drawn many of the illustrations. Decades of work have been compressed into a few hundred pages to put the essential facts about grasses in Western Australia where anyone who needs this basic information can put his hands on it. Make no mistake; it is an important book. Multiplication tables are dry stuff but the world's business depends upon them. Grasses are funny kinds of plants without spectacular flowers but they clothe the land. They are the basis of our national economies. They are daily becoming more dominant over the earth's surface. Biologically, it might be more correct to refer to the present time as the Age of Grasses rather than the Age of Man. The author understands these matters though he has had neither time nor space to write much about them in this volume. However, in a bare five pages of foreword he has a few telling paragraphs. "We are prone," says he, "to regard our natural assets as something available to us for immediate use, but it should be remembered that agricultural and pastoral practice without husbandry, is comparable with mining, and that uncontrolled exploitation with its attendant evils may lead to the conversion of valuable country into desert."—E. A.

Old bricks from the boiler house at the Garden are being used to pave some of the paths and a small area opposite the west entrance in the Palm House. It provides a foreground from which the palm collection can be viewed to advantage.

Slippery Elm branches force readily in the house and make a more interesting bouquet than one might imagine. The flower buds are much larger than those of the common elm and a bright rusty brown. The actual flowers are little more than bunches of stamens but they are interesting to watch and lend an air of spring to the living-room.

FOR SALE: PAPERS BY DR. GEORGE ENGELMANN.—In cleaning out an old cupboard a bundle of reprints of several papers by this pioneer St. Louis botanist was found, and they are being offered for sale to the general public. One of them, "Revision of the Genus Pinus and Description of *Pinus Elliottii*" (from Trans. Acad. Sci. St. Louis. Vol. 4. 1880), is of folio size. It comprises some 29 pages of text and includes three black-and-white lithographs showing pine foliage and cones. Though technical in nature the plates are large and clear and would make interesting pictures for the hallway of a country home. This reprint is priced at one dollar, post paid.

The other reprints are of short papers also from the Transactions of the St. Louis Academy, and such illustrations as they have are of purely technical interest. They are priced at twenty-five cents each. There are five papers in all, two of them being bound together, as follows:

Heavy Rains at St. Louis. Trans. Acad. Sci. St. Louis, vol. 2, pp. 266–267. 1867.

Remarks on Viburnum and Cornus. Bound with above, pp. 269–271.

The Flowering of *Agave Shawii*. Trans. Acad. Sci. St. Louis, vol. 3, pp. 579–582. 1877.

The American Junipers of the Section Sabina. Trans. Acad. Sci. St. Louis, vol. 3, pp. 584–592. 1877.

A Synopsis of the American Firs. Trans. Acad. Sci. St. Louis, vol. 3, pp. 593–602. 1878.

Our short note in the November BULLETIN on the general uselessness of horse-chestnuts has prompted one of our readers to copy off for us the following quotation from a thrifty Frenchman who raised a similar query over 150 years ago.

> "I remember my having read, many years ago, several grave dissertations on the manner of employing the horse chesnut as food for cattle. Every Academy in Europe has, at least, proposed that the horse-chesnut was useless, unless prepared by a very expensive process, and that, even then, it was good only in the manufacture of tapers and hair-powders. I was astonished at this: not that Naturalists should be ignorant of it's use, and that they had studied it merely as an article of luxury, but that Nature should have produced a fruit of no use even to the brute creation. But I was at last cured of my ignorance, by the brutes themselves. I happened to take my walk, one day, to the *Bois de Boulogne*, with a branch of the horse chesnut in my hand, when I perceived a goat feeding. I went up, and amused myself with stroking her. As soon as she perceived the horse chesnut bough, instantly she seized, and snapped it up. The lad who tended her told me, that the goats were all very fond of this plant, and that it contributed greatly to the increase of their milk. I perceived, at some distance, in the chesnut alley, which leads to the *Château de Madrid*, a herd of cows eagerly looking for horse chesnuts, which they greedily devoured, without sauce or pickle. Thus, our learned and ingenious systems conceal from us natural truths, with which every peasant is acquainted."
>
> (From "Studies of Nature," by James-Henry-D. Bernardin de Saint-Pierre. p. 21. Translated by Henry Hunter. London, 1801. Printed for J. Mawman (Successor to Mr. Dilly) in the Poultry.)

NOTES

Mr. A. P. Beilmann, Manager of the Arboretum, has been reelected president of the St. Louis chapter of the Friends of the Land.

Dr. Hermann von Schrenk, for over forty-five years Pathologist to the Garden, died on January 30. His association with the Garden began in 1896 when he was a graduate student in the Henry Shaw School of Botany of Washington University. A biographical sketch of Dr. von Schrenk will appear in the next issue of the BULLETIN.

An anonymous gift has made it possible to establish a Museum of Economic Plants at the Garden. It is being housed in the Old Museum building just inside the Cleveland Avenue gate and is now open to the public, except when the auditorium is in use by any of the local societies which meet there. Dr. Hugh C. Cutler, a former graduate of the Henry Shaw School of Botany, will be in charge of the Museum as Curator of Economic Plants. He comes to us from the Chicago Museum of Natural History (formerly known as the Field Museum) where he has been Curator of Economic Botany.

The annual Orchid Show at the Garden was opened to the public on Sunday, February 1, and will continue throughout the month. The principal features are a terrace garden of Cypripediums from the Brownhurst collection and a large central area of massed Cymbidiums in shades of brown, beige, and pink. At both sides are open-work display cabinets containing English Slipper Orchids (Cypripediums) and specimen plants of Cattleya hybrids. The technical problem of staging Moth Orchids and Pitcher Plants has been solved in a novel fashion by hanging them from simple gilt trellises against panels of pale pink. As a result, the individual plants are shown to perfection, yet the display gives a pleasing over-all effect and does not look spotty. This year's Orchid Show contains 5,000 plants, the largest number ever exhibited here.

THE MISSOURI BOTANICAL GARDEN

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SOME FACTS ABOUT THE GARDEN

The Missouri Botanical Garden was opened to the public by Mr. Henry Shaw about 1860. From that date until his death in 1889 it was maintained under his personal direction. Although popularly known as "Shaw's Garden" the name Missouri Botanical Garden was chosen by Mr. Shaw and he definitely indicated that he wished it called by that name. The Garden passed at his death into the hands of a Board of Trustees, designated in Mr. Shaw's will, and the Board so constituted, exclusive of certain ex-officio members, is self-perpetuating. By a further provision of the will the immediate direction of the Garden is vested in a Director, appointed by the Board. The Garden receives no support from city or state but is maintained almost exclusively from the estate left by Henry Shaw. Since 1939 many Garden Clubs and interested individuals have contributed to a "Friends of the Garden Fund" which is used in developing the new Arboretum, located at Gray Summit, Mo. The Arboretum (1) serves as a source of plants, trees and shrubs for the city Garden; (2) affords areas for gradually establishing a pinetum, a wild-flower reservation and various other features on a scale not possible in the city; (3) provides greenhouses for some 50,000 orchid plants.

The city Garden comprises 75 acres, where about 12,000 species of plants are grown, both out of doors and under glass. It is open every day in the year except New Year's Day and Christmas; week days, 8:00 a. m. until 7:00 p. m.; Sundays, 10:00 a. m. until 7:00 p. m. The greenhouses are closed every day at 5:00 p. m.

The main entrance to the Garden is at Tower Grove and Flora Place, on the Sarah bus line (No. 42). The Southampton buses (No. 80), direct from downtown, pass within three blocks of the main entrance.

MISSOURI BOTANICAL GARDEN BULLETIN

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COVER: Coyol Palm before being uprooted.

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Please: Do not discard a copy of the Bulletin. If you have no further use for yours pass it along to a friend or return it to the Garden. Return postage will be guaranteed.

Missouri Botanical Garden Bulletin

Vol. XLI MARCH, 1953 No. 3

PEPPER AND SALT, OUR EARLIEST WILD FLOWER

EDGAR ANDERSON

It is appropriate that this account of one of our commonest wild flowers should be without any illustration. Because of its peculiar mode of blooming no picture does it justice, and most of those which have been attempted are positively misleading. Pepper and Salt is just coming into flower as this number of the BULLETIN goes to press and it will remain in flower for several weeks, but it comes out so early and is so hidden in the leaves that few Missourians have ever noticed it.

Pepper and Salt is the common name by which it is known to country children. Books refer to it as Harbinger-of-Spring, and for purposes of scientific precision it has the official scientific name of *Erigenia bulbosa*. Pepper and Salt is a good name for it, particularly when it first comes into flower at the end of winter. It then looks almost exactly like a small gob of mixed salt and pepper from a child's lunchbox which had somehow fallen on the dry leaves of the forest floor during a picnic. Closer examination shows that it is a bunch of flowers and that it is not really black and white. There are several small flowers set so closely together that the separate outlines are obscure. The petals are white, or nearly so, and in among them are stamens so dark purple that they appear black to casual inspection. Technically, the plants belong to the Parsley family, and its flowers form a small umbel with delicate pale green leaves beneath, something like those of a young seedling carrot.

Pepper and Salt comes into bloom on sunny days in late winter and pokes its head up here and there among the leaves of the forest floor. A single flower head is seldom bigger than the nail of your little finger, and since flowering begins right down among the leaves you have to have sharp eyes to find the flowers when they first open. Even for those who know the plant it is simplest to track it down about the time when it goes to seed and is several inches high. Since it comes from a little underground bulb it will appear in the same place year after year. Trying to find it at some

well-remembered spot, when you know it really must be there, is an amusing game. You stand there, knowing that several plants are probably within a few inches of your feet, and look sharply here and there among the dry leaves. Sometimes when it grows abundantly on a slope and when the blooms are far enough advanced to stick up a little above the leaves, the flowers may catch the sunshine and be conspicuous. Then it is wonderful in the bare spring woods, before other flowers are even hoped for, to come upon a whole hillside of these delicate little blossoms and feel that another spring is just around the corner.

PIN OAK YELLOWS

FREDERICK G. MEYER

Pin Oaks *(Quercus palustris)* in the St. Louis area and throughout the eastern states are subject to a disagreeable condition known as Pin Oak Yellows. This condition is due to iron chlorosis or to a non-availability of iron in the soil. The normal amount of chlorophyll is not produced, which causes the leaves of the affected trees to turn uniformly yellowish green, or often only the veins remain green. The terminal growth of twigs is slight and the trees are generally stunted and unhappy-looking. Pin Oaks thus affected are greatly weakened, become subject to other diseases, and may eventually die.

This sickly condition is an indication of an alkaline soil, and it may be overcome by the addition of certain chemicals to the soil or by spraying the leaves. The following chemicals will produce the most lasting results, but should be applied to the soil in early spring (chemicals of agriculture grade are cheap): a 50-50 mixture of ferrous sulphate and mist wettable sulphur at the rate of 1 pound for each inch of trunk diameter. An even quicker response may be obtained by substituting aluminum sulphate for half the sulphur. About 10–20 holes should be made for each inch of trunk diameter. Using a crowbar or some such tool they should be made about 18 inches deep, at an angle towards the trunk.

For very quick response, but of less lasting results, spray the leaves during late spring or early summer after the yellowing symptoms have become fully apparent, with a solution containing 5 pounds of ferrous sulphate and 2 pounds of soy-bean flour in 100 gallons of water. An ordinary kitchen detergent may be added as a wetting and spreading agent. For the home gardener, the spray method is not as practicable as the soil application, because a high-pressure sprayer is essential for complete coverage, especially with large trees. For smaller trees, though, an ordinary home tank-sprayer will work. The response to greening after spraying is amazingly rapid, and after two weeks the leaves will be green again.

THE COYOL PALM

Mature tree ready for felling; young tree; bottle of Coyol wine corked with corn cob; leaves stripped from trunk; "expert" cutting trough in felled tree.

THE COYOL PALM AS A BEVERAGE TREE

GEORGE F. FREYTAG

Those of us who have been lucky enough to visit our neighbors to the south are usually amazed by the variety of ways in which the palm family enters into the life and traditions of these Latin American peoples. The Coyol Palm, though a minor element of this great palm family, is encountered in practically every little town and village in Central America. A particularly beautiful group of these palms is the grove which surrounds the school of tropical agriculture in El Zamorano, Honduras. It is here that the author became acquainted with some of the palm's uses.

The Coyol Palm (*Acrocomia mexicana* Karw.), which gets its popular name from the Spanish word *coyol*, meaning ball, is used for a great many purposes. Its fruits and the "cabbage" or growing apex are used for food, its spines for needles, its leaves for fencing material, and its juice for a

beverage. This last is as typical and welcome to Latin Americans during the hot dry season as is apple cider to the North Americans during the fall and winter.

The season for Coyol wine, or "Vino de Coyol" in Spanish, is awaited with eager anticipation by both young and old. By February many an old vino lover will have scouted around, located, and made arrangements to obtain a Coyol tree in order to assure a supply of the wine during the height of the Easter festive season. During this time much of Central America is truly suffering from an unbelievably hot, dry spell, often not a drop of rain having fallen since November. Temperatures run from 90 to 100° F., so that such a beverage really hits the spot. Perhaps it is this burning heat or, as the Latin Americans think, the knowledge that the rains will begin to fall during the succeeding month that makes the sap of the Coyol Palm collect and concentrate in the trunk. It is at this time, and appropriate for the festivities of holy week, that the Coyol may be made to yield its delectable beverage.

The extraction of the juice is best done by an expert in order that the flavor and quantity be of the highest, and it is for this reason that the palms are secured so long in advance. The location and procurement of specimen trees may cost as much as ten dollars, which is a good deal considering the means of these people and the fact that the tree may be rendered useless by any one of a number of subsequent steps. First, the tree must be felled when the moon is just right (so the saying goes); this can be best judged and done by our "expert." Great care must be taken that no damage is done to the crown for it is this region that will yield the wine. If the crown is damaged, fermentation or insects may ruin it for later tapping. The tapping is done by excavating a small trough in the tip of the trunk. This should not be done immediately the tree is felled for once again the moon must play its part. When the palm has been carefully trimmed of its leaves the next step is to cart it to the extraction locale (usually the backyard of the "expert" who may run the local saloon and thus specialize in such matters) where it is laid out in line with numerous other palms giving the place a strong resemblance to a morgue or perhaps an alligator farm. Finally, the propitious time having arrived, the growing crown or cabbage of the palm is so cut as to leave a 5-inch rectangular trough in the trunk near the upper end where it is just large enough to permit such a cavity. This is usually just slightly below the base of the last-formed leaf and is very hard to locate even by our "expert," being hidden by sheathing leaf bases, spines, and miscellaneous fibrous material.

Immediately the cut is made the juices flowing from the lower regions of the trunk begin to fill the trough. Flow usually stops after some eight to

ten hours and thus new cuts of the flowing surface must be made daily. The initial cutting and each daily trimming of the flowing side of the trough must be made early in the morning so that the trough may be periodically emptied for the waiting public during the day. Collection hours are at 10 A. M., noon, and at 4 P. M. Early collections are partaken of by young ladies while the habituals and those who like their wine with a "kick" choose the later hours when fermentation is quite advanced. It is not uncommon that these later drinks may cause drunkenness.

Fermentation sets in rather rapidly for the fresh juice is very sweet. Coyol wine has a flavor such as might be obtained by mixing the familiar cocoanut juice with a strong solution of baker's yeast, then adding a dash of freshly pressed sugar-cane squeezings and allowing the whole to ferment slightly. At its best it is a very pleasant drink with an attractive bluish-white almost transparent appearance and the refreshing flavor of a naturally carbonized drink. Because of the speed with which this fermentation takes place all transportation of the wine is done with the greatest care. If the wine is not consumed on the spot (the recommended procedure) it is usually put into a bottle with a few grains of corn. Bubbles continually arise from the corn which serves as a stirring mechanism preventing the accumulation of dissolved carbon dioxide or "fizz" of our modern carbonated beverages, which might cause near-explosions when the bottle is jolted or shaken. The bottle is corked by a piece of corn cob previously thrust into a fire to burn off chaff, and pierced by a nail to allow the escape of gas. This fermentation, if allowed to go to completion, forms a very potent vinegar which is made even more potent and given a unique flavor by the addition of pieces of onion and hot peppers.

Among the innumerable stories concerning the attributes of Coyol wine is that told me by Don Abel Gamero, a distinguished college professor of Central America. A friend of his who had led a normally healthy life until middle age suddenly became stricken by an unknown disease. After seeking aid from doctor after doctor without results, and having wasted away to but a shadow of his former self, he turned in despair to the "home remedies." Yes, needless to say, the use of Coyol wine has made him the village strong man, and as such he was pointed out to me. This is not told in jest for this is the attitude of most Latin Americans in regard to this drink. Surely it is that the fermentation could have provided just such a boost in vitamin content as might be needed to "balance" the diet of these people. Thus more and more old wives' tales are found to have an element of truth in them, with the result that these stories now provide us with clues to direct us in our further research.

HERMANN VON SCHRENK

Photographed October 29, 1935, at the "Old Field Bog," Greencox, Mo.

HERMANN VON SCHRENK (1873-1953)

AUGUST P. BEILMANN

The death of Dr. Hermann von Schrenk, on February 6, has deprived the Garden of one of the oldest staff members in point of service. A graduate of Cornell University in 1893, he received a master's degree from Harvard University the following year and his doctorate in plant pathology from Washington University in 1898. He was Professor of Plant Pathology in the Henry Shaw School of Botany, Washington University, from 1906 to 1913, and joined the Garden staff as Pathologist in 1907. He was the first pathologist in charge of the Mississippi Valley Laboratory, Bureau of Plant Industry, United States Department of Agriculture, and served until this laboratory was combined with the newly formed Forest Service in 1907.

Dr. von Schrenk was a member (and in several instances an officer as well) of many scientific and professional organizations. Among others, he was a member of the National Research Council, Central States Forestry Conference, American Society for Testing Materials, National Conservation Conference, Academy of Science of St. Louis. In addition he had served as president of the Audubon Society of Missouri, the Garden Club of St. Louis and the Missouri Forestry Association. Largely through his efforts private funds were obtained which permitted the appointment of the first State Forester in Missouri. He initiated the International Toxicity Conference and presided over the meeting which was held in 1930 in Berlin. Following this he arranged for a Conference of Wood Technologists and Pathologists which was held in April, 1931, at the Garden.

The solution of the problem of impregnating timber with creosote came in 1904 during the St. Louis World's Fair where, as Pathologist in charge of the Mississippi Valley Laboratory, he had set up a demonstration of timber treating. The proposed method quadrupled the useful life of timber so treated and proved to be tremendously important to American railroads. Through the years there were few projects involving the extensive use of timber that did not lean heavily upon his knowledge of this subject. As a timber consultant his services were much in demand and he wrote, or assisted in writing, most of the specifications involving treated and untreated timber which are in use to-day.

Arriving in Missouri as a young man, before the turn of the century, he had the unique opportunity to study the forests in those very years when Missouri logging reached a peak. Often an unwilling participant but always an interested bystander, he saw the financial giants wrestle for railroad right-of-way in the swamps of southeast Missouri. His deep interest in

trees, their diseases and the utilization problems of timber, were early recognized, and he was furnished passes which allowed him to travel by railroad at will. He was one of the last men to see and study the bleached trunks of those trees which died after being submerged by the New Madrid earthquake. His interest in this swamp—which supported the greatest stand of hardwoods ever to grow in the United States—carried over into a number of court cases involving disputed boundaries and claims arising from damages to trees. His appearance in court was always an event. Frequently facing an array of opposing talent of formidable proportions, the meticulous preparation for his part of the testimony demonstrated the thoroughness and the extent of his knowledge. One privileged to work with him during these tense situations came away with a reverential respect for his almost unlimited capacities.

He was not an easy taskmaster, nor was he especially patient with his colleagues. Always intense, he tackled each problem as though nothing else mattered. A firm believer in the evidence supplied by experimentation, many of his projects were set up to be evaluated regularly through a period of twenty or more years. An early user of the camera as a scientific tool, he was able to illustrate almost any subject in his field from his photographic files. He was also an ardent collector and amassed a tremendous collection of tree specimens showing abnormalities of physiological interest and invasions by pathogens. This collection was quite recently transferred to the University of Minnesota, where it is filed in display cases in a special room and known as the "von Schrenk Memorial."

Hermann von Schrenk had a catholicity of interests. His writings ranged from surveys of tornado damage to trees through all phases of wood technology to life histories of obscure fungi and plant parasites. The von Schrenk garden in the Florissant Valley was a mecca for serious plantsmen. His enthusiasm for new species and varieties was shared by Mrs. von Schrenk, and few seasons passed in which an imposing list of new things was not undergoing trial. It was never difficult to arouse his enthusiasm if he felt a project had some merit. On one occasion this led to an elaborate nutritional study in which pigs were fed an assorted list of common weeds. Then considered a questionable innovation, it has since been given serious study in animal nutrition research.

As a result of his travels, his work, and correspondence, he was known wherever trees were grown or timber was used in construction. This led to an offer in 1931 from the Russian Government which wished to secure his services in setting up a forestry and wood preservation program. He was offered a lifetime retainer if he would consult with the Russian foresters in Moscow. He refused this offer, pointing out that so much remained to be done in wood technology in this country.

If it could be said that Dr. von Schrenk had a consuming interest in a single tree it was the Cypress. He did much to call attention to the peculiar qualities of this wood and he studied and photographed all the major forest stands of cypress timber throughout the South from Florida to Mexico. No other investigator knew Cypress half so well. Through his studies he became intrigued with the variations which were encountered. To test the permanence of such variability he had seed collected of all the known forms from many southern stations. The seeds were grown at the Garden and the seedlings were eventually set out at the Arboretum.

It is only fitting and proper that the group of Cypress now growing at the Pinetum Lake should become a living memorial to Dr. Hermann von Schrenk who spent a lifetime in the study of this tree. Through their longevity they will remind future generations of the work of a great man who was able to translate Science into terms of simple human needs and services.

FLORA MONACENSIS,
A MEMORIAL TO DR. HERMANN VON SCHRENK

Shortly after Dr. von Schrenk's death the Garden received a check from the St. Louis Garden Club as a memorial to him with a suggestion that it might be used in binding up books in one of the fields in which he was interested. It arrived just as Mrs. von Schrenk had turned over to the library a set of fascinating old volumes which Dr. von Schrenk had placed on deposit in the library nearly forty years ago. Although the plates were in excellent condition they had come into Dr. von Schrenk's possession in such condition as to be virtually unbound; all these years they have been kept securely wrapped in heavy brown paper and have been consulted only under dire necessity. The check from the St. Louis Garden Club will make it possible to bind them up functionally, if not handsomely, in four large volumes. The books take on added interest from the circumstance that the author, Franz von Paula von Schrank, came from the same part of Europe as did Dr. Hermann von Schrenk's ancestors, and in spite of the slightly different spelling of the name he may have belonged to the same family. The volumes had apparently been in the library of Dr. von Schrenk's father, a distinguished educator in one of the classical "Akademies" formerly maintained in this country by intellectual German-American families.

The "Flora Monacensis" is one of those sumptious works produced during the period when science was largely carried on under royal and aristocratic patronage. It is not only handsome and interesting, but its 400 plates are still of technical scientific importance, made doubly so by the extreme rarity

of the volume in North American scientific libraries. Its full citation is as follows:

> Schrank, Franz von Paula von. Flora Monacensis seu plantae sponte circa Monachium nascentes quas pinxit et in lapide delineavit Johannes Nepomecenus Mayrhoffer, commentarium perpetuum addidit Franciscus de Paula de Schrank. (Flora of Munich or plants growing spontaneously in the environs of Munich which Johann Nepomuk Mayrhoffer painted and engraved on stone; descriptions added by F. von Paula von Schrank).—In 4 volumes grand folio, 2 portraits, one of Mayrhoffer, one of von Schrank; 400 descriptive pages and 400 hand-colored lithograph plates of plants (life size), 100 pages and plates to a volume. Vol. 1 (1811), 2 (1814), 3 (1816), 4 (1818). Printed in Munich.

The author of the Flora, Franz von Schrank, was born in Upper Austria, two centuries ago, and after various posts as a University teacher and administrator he finally settled down in charge of the Botanical Garden at Munich where he died in 1835 at the age of 89. E. A.

A LETTER FROM TEXAS TO GEORGE ENGELMANN

ROLLA M. TRYON, JR.

In the February 1952 BULLETIN a brief note appeared on the discovery of some misplaced correspondence and notes of George Engelmann. Of particular interest was a series of letters from Ferdinand Lindheimer, the most noted of early Texas botanists, who sent his specimens to Engelmann for naming and distribution. These letters, written in German script and illustrated with maps and sketches of botanical interest, appeared most difficult to decipher, for the pages are written on twice, once in the conventional manner in black ink and crosswise to this in red ink. The BULLETIN note brought us a most interesting communication from Lindheimer's granddaughter, Mrs. Sida S. Martin, of San Antonio. Mrs. Martin generously offered to translate the script with which she was familiar and she has supplied the translation which follows. The map was drawn over the writing, but in the accompanying illustration the script has been removed in the process of reproduction.

Rec'd Nov. 27, –44
Ans. Dec. 8 –44

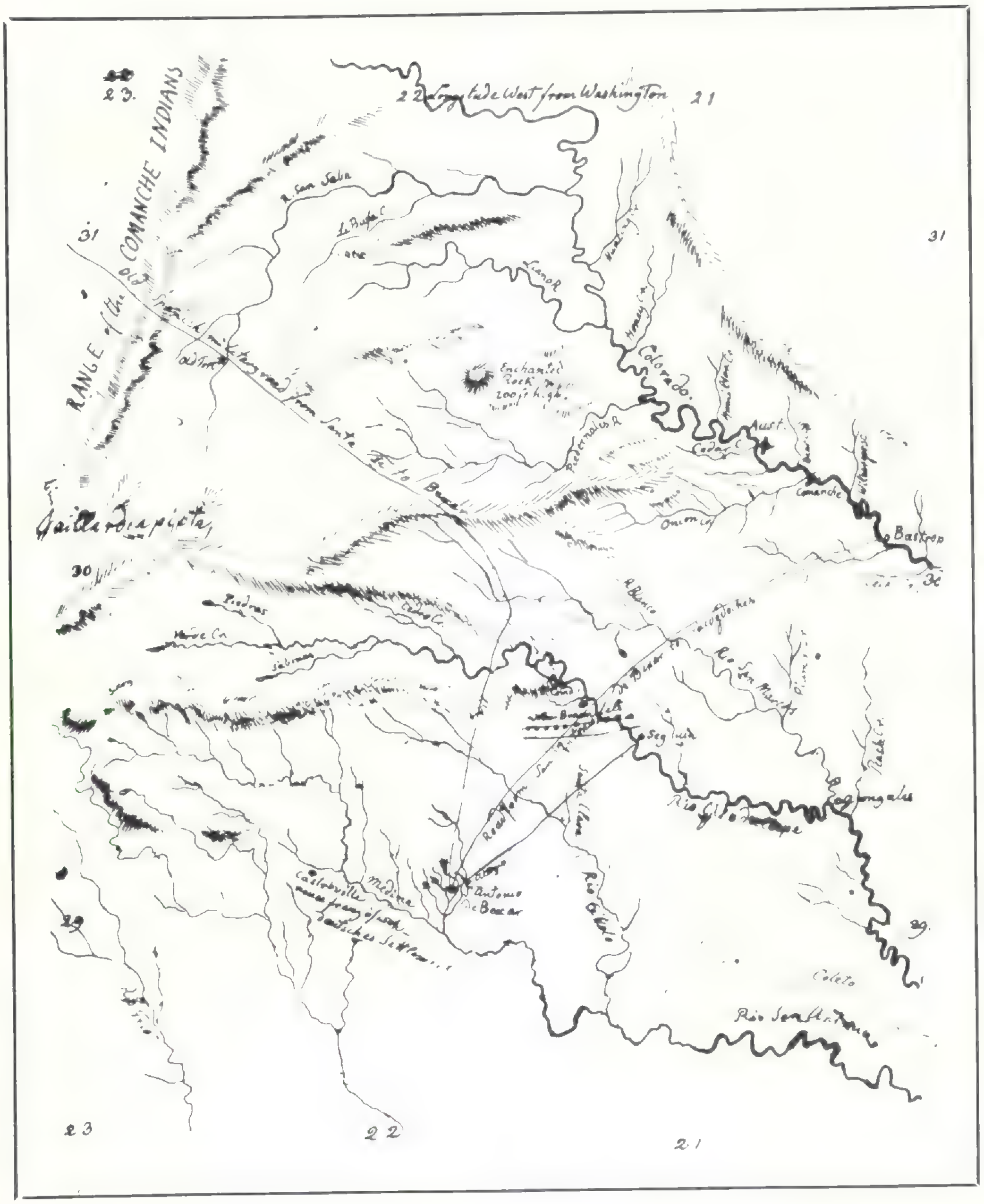
Industry, Texas
Oct. 19– 1844

Dear Friend:

Your last letter was dated Aug. 22 of this year and I received same in Sept. and I answered it soon after receiving it or before the end of said month.

My two plant collections had not been received by you at that time. A third collection is ready and I will send same as soon as I hear from you that the previous two have been received.

In my last letter I considered it advisable not to go to San Saba for the autumn, however now I am becoming restless here. And I do not seem to be able to locate a proper house for the winter. At this time I am thinking it is better to go, even though I have no money, no clothes nor blankets. But I have a fine horse that can endure hardships, and I have good guns and good health. Also 6 or 7 reams of paper. In planning this undertaking and the necessary risks entailed, I will rely at first on your help and the help of friends and realize full well that I must curtail all expenses.



Lindheimer's map of a portion of central Texas; San Antonio north to the San Saba River. 1844.

I would like to give you an idea of this particular undertaking. It will require all of my strength and energy. And I might be like the Frankfurt correspondent in the Schnellpost (fast mail) when writing of the so-called Nobility Club (Adetsverein) but I do not have the proper data at present and do not wish to becloud the issue with *when* and *if*. But within a few days I will have the details for you.

Oct. 29:—Ten days later, and I still cannot give you any positive details regarding my plant collections that are to be sent you nor about my expedition to the west.

I have made inquiry of Reis & Nichols regarding the two collections that were sent but to date have received no answer. The third collection is now packed and ready and I am rushing to get this my monthly report to the post in order not to miss it.

But I have received no messages from you this month. All of my last business duties are completed and I am ready for the trip and my heart is beating fast with impatience. I have no interest in the little issues that arise in a small close community for discussion.

The wings of my imagination are fluttering merrily in the free-born breezes of the heavens and as the sail of the ship swells with proud impatience so swells my heart at the prospect of the new and adventurous undertaking. Let the timid or the fearful remain in their cabins or their tents, give me the freedom of the open road and the pleasure of the saddle.

And now it seems again as though I were parting from you dear friend a second time but before I go I will see to it that another letter is mailed to you.

The news about Lt. Fremont Expedition was recounted here in the local papers.

In the year 1841 a German pharmacist by the name of Schimmelphennig spent the summer near Victoria and Guadaloupe about 100 miles from here in a southwesterly direction and collected plants and birds which he sent to Dresden and later joined a trading party to go to Mexico.

At the same time with this letter I am sending the third collection of plants by way of Houston. Reis & Nichols in Houston will then send this box to Messrs Ruddecke Woods & Co. in New Orleans. And I asked these men to insure this box for $100.00 and sent it by Mississippi River boat on to you.

The first collection I requested insured for $80 and the second for $30.

Mr. Sieper the merchant who is also the Postmaster here, was kind enough during the summer to credit my needs for supplies.

When you send me the money you owe me I wish to ask you to arrange it in such a manner that Mr. Siepers, who has signed this in his own handwriting, will be able to draw his amount.

Also you may address all letters & communications to me here.

Your friend
F. Lindheimer

P.S. A physician Dr. Brickleffs asked me to inquire of you if there is an opening in the U. S. Army or Navy for a physician. Please notify Mr. Siepers if you can obtain any information on this matter.

If you are feeding birds in your garden, water is even more attractive than food, particularly during the winter season. One may use a heater to keep it thawed but during open winters such as the present one it is quite sufficient to use a small basin filling it with warm water and flushing it out at noontime with hot water if need be. If the night bids fair to go well below freezing, if the basin is emptied in the later afternoon or early evening it will be simpler to take care of the next morning.

BIBLIOGRAPHICAL NOTES

Saint-Hilaire's "Flora Brasiliae Meridionalis"

NELL C. HORNER

In 1948 the Garden purchased from Bernard Quaritch, of London, a folio edition of Auguste de Saint-Hilaire's "Flora Brasiliae Meridionalis," published in 1825–1833. When the books arrived they proved even more impressive than the catalogue had stated—three large volumes (13 × 20 inches) with beautiful calf binding lettered in gold, fine paper and printing, and exquisite hand-colored plates of plants drawn life size and engraved on copper. On checking the work with the bibliographic reference in Pritzel's "Thesaurus Literaturae Botanicae," it agreed as to the folio size, the number of colored plates, and the artists (plates in Vol. I by Turpinio; in Vols. II and III by Delile) but disagreed in the following particulars:

Title.—The title in Pritzel was given as "Flora Brasilinae Meridionalis," but the *n* in Brasilinae was evidently a typographical error.

Volume I.—Pritzel lists this volume as having 395 pages, but ours had only 305. He gives the date of publication as 1825, which is also the date on the title-page at the beginning of our volume, but following page 132 in ours is a second title-page and an *avertissement* page dated January 1827. This title-page gives Adrien de Jussieu and Jacques Cambessedes as joint authors, and in the *avertissement* Saint-Hilaire states that their assistance is due to "alterations de ma santé" (my health).

Volume II.—Here again there was a difference in the number of pages, our copy having 275 pages, while Pritzel's had 381. The three authors mentioned above are also authors of this volume.

Volume III.—This volume, according to Pritzel, has the pages numbered from 1 to 160. However, ours was numbered as follows: 1–65, 66–70 unnumbered, 71–72 missing, 73–128. In our copy, pages 1–65 (1832) are credited to the three authors, pages 73–128 (1833) to Saint-Hilaire alone. Pritzel does not mention the authorship of this volume, and one would assume that it was the same as for Volume II.

Now we were puzzled. Either Pritzel was referring to another edition, although he listed only one (the folio with colored plates), or our set was very incomplete. Quaritch wrote that we were supposed to have a perfect set but they were unable to trace another *folio* set in any London library with which to check it and "another such copy had not passed through their hands in forty years." However, one of their representatives checked a *quarto* edition (having black and white plates) in the Royal Horticultural Society library and reported that although the pagination differed, the first and last words in all three volumes agreed with ours. Mrs. Lazella Schwarten,

Librarian at the Arnold Arboretum, Boston, also checked our folio set against their quarto, with the same results. Moreover, the pagination in the quarto edition agreed with that in Pritzel. Presumably Pritzel had confused the two editions for, except for the size and the plates being colored, his description applies to the quarto edition.

In the midst of the controversy Dr. Rogers McVaugh, of the University of Michigan, who happened to be visiting the Garden, asked to see Saint-Hilaire's "Flora of Brazil." He had never seen a folio edition although he had heard that there was one, and he suggested that we call the attention of botanists to this rarity. He also told us that some bibliographers had almost despaired of finding a reference to it. With this challenge we began a search for bibliographic references to the work and we found one in *Flora* (Vol. 9, no. 2, Beilage p. 96. 1826). Translated from the German it is as follows:

> This Flora of Brazil will be for the eastern part of America what the Humboldt & Kunth was for the west coast. The work will be in three volumes which will appear in bi-monthly lieferungs. The first four lieferungs are finished. In quarto on glossy Jesus paper with 8–10 black copper plates and 5 sheets of text. In folio on glossy Jesus vellum paper from Annonay [a paper-manufacturing town in France] with colored plates and 8 sheets of text. A prospectus describing the work is available at all bookdealers. Price 16 Rthl. 16 Gr. Sächs oder 30 Fl. rhein.
>
> Wilhelm Schäfer

We do not know how much money the price given above represented, but the value of the work (apparently the quarto edition) is given in Pritzel (1872) as 360 fr. The following advertisement which appeared in *Hooker's London Journal of Botany* in 1842 suggests that the folio work was even at that time becoming a rarity.

> LIVRES NOUVEAUX
> H. Ballière
> 219 Regent St., London
>
> AUGUSTE SAINT HILAIRE, Flora Brasiliensis, ou Histoire et Descriptiones de toutes les plantes qui croissent dans les differentes provinces du Bresil. This beautiful work was published in 24 livraisons, forming three volumes, grand 4to, with 192 engraved plates. *7 £.* 10 *s.* The last livraisons should be furnished at the price of 15 *s* each.
>
> There are some copies, 3 volumes in large folio, velin paper, with illustrations colored and retouched with a "pinceau," 25 *£.—The plates having been destroyed and possessing only a very few copies of this magnificent work, I can supply at this low price for only a short time.* [Translation]

Thinking that the Muséum National d'Histoire Naturelle, in Paris, would surely have a copy of this French work we wrote to them for information. Following is a free translation of the answer received from Mme. Melle Madier, the librarian:

> Herewith are the facts that I have collected on "Flora Brasiliae Meridionalis" de Saint-Hilaire.
>
> This work was published by Belin, at Paris, in parts, beginning in 1824, and in two formats: in –4° and in –Folio. We have only the quarto edition, but the Biblio-

thèque Nationale, according to its catalogue, possesses the folio edition, the title of which seems to be the same as Pritzel gives in his "Thesaurus."

The announcement of the work is also given in 1824 in the *Bibliographie de la France;* "The work will be in 3 volumes which will appear by livraison, every two months, Price in 4° jésus papier satine, 15 fr.. In folio jésus papier velin satine d'Annonay, colored illustrations, 60 fr." [glossy perhaps considered as the translation of the word "satine"].

The term jésus characterized the grandeur of the sheet of paper, and this name shows in the mark of the fabric: J.H.S. "monogramme de Christ," which was imprinted in transparence in the sheet of paper according to the form, in order to designate the format.

After all the evidence was in, it appeared as if the old reliable Pritzel had failed us. He made no mention of a quarto edition yet the pagination he gives agrees with that of the quarto set at the Royal Horticultural Society and at the Arnold Arboretum. And if he mistakenly called the quarto edition a folio he also erred in giving it colored plates. However, if our set had checked with Pritzel we might not have known that we had an edition of an important botanical work so rare that we have been able to trace definitely only one other copy, and that in Europe.

NOTES

Mr. G. H. Pring, Superintendent of the Garden, as one of the trustees of the American Orchid Society, attended its board meeting in New York, March 11. On March 15 he acted as chairman of judges at the Nashville Orchid Show.

At the February meeting of the Board of Trustees, Mr. John S. Lehmann was elected President of the Board and Acting Director of the Garden. The previous president, Mr. Richard Lockwood, will continue to serve as a Trustee. Dr. George T. Moore was made *Emeritus* Director and will remain at the Garden in that capacity.

The Cineraria Show in the Floral Display House will be open to the public on March 8 and will continue through March 22. Although the cinerarias will dominate, the display will also contain primroses, cyclamen, amaryllis, calla lilies, and other spring flowers. The Easter Show will be ready by March 29 and will continue through April.

The February number of the ANNALS OF THE MISSOURI BOTANICAL GARDEN (Vol. XL, No. 1) was issued recently, with contents as follows: Bluegrass Pasture Almanac, by Alfred G. Etter; The Popcorns of Turkey, by Edgar Anderson and William L. Brown; A Preliminary Survey of the Milpa System of Maize Culture as Practiced by the Maya Indians of the Northern Part of the Yucatan Peninsula, by R. A. Emerson.

The Missouri Botanical Garden Grass Herbarium:—Some of the most important changes at a botanical garden take place so slowly that no public announcement is ever made. They can be so gradual that even those of us who work here fail to note them unless some specific incident reminds us of what used to be. During the last five years a change of this sort has been going on in our grass herbarium and we now have one of the finest and most effective collections in the New World.

The beginnings of our grass herbarium go back to the time of Henry Shaw's friend, Dr. George Engelmann, who took a lively interest in this important group of plants and exchanged specimens with many of the important grass authorities of his day. During Dr. Trelease's time several important purchases were made, and the collection has continued to grow. It is one thing, however, to have such a collection and it is quite another to have it in a usable condition. This is particularly true of grasses. Though fundamentally no more difficult to understand than roses or buttercups (and by no means so perplexing as the milkweed family with which Dr. Woodson has long been occupied) they have many special features. One who is going to understand the grasses of any region must first gain a thorough understanding of the characteristics of this important family of plants. This is asking too much of most busy scientists. Many botanists, professional and amateur, who know the rest of the flora of a region have only a nodding acquaintance with its grasses. So it came about that up until five years ago, though the Missouri Botanical Garden possessed one of the world's finest grass herbaria, virtually no one knew of its importance, and scholars needing to consult it would have had to put in weeks (if not months) of careful work before the collections could be used.

It was not until Dr. George Van Schaack was made Honorary Curator of Grasses in 1947 that the task of ordering up this important collection was begun in earnest. On nights and Sundays, on holidays, and during much of his vacation for over five years he has worked at the collection. Only those of us who have helped him realize what a gargantuan task it has been. Whole sections of Dr. Engelmann's grass herbarium still lay in the original bundles, unopened since they had been turned over to the Garden over half a century ago. There were whole cases full of grasses which were virtually unsorted, including many specimens which had never been identified.

Winter and summer, for over five years, Dr. Van Schaack has stuck at his self-appointed task. This winter the last big block of unsorted material has been incorporated in the herbarium. There is still much to do but the main job is over. To those of us at the Garden it is a satisfaction to see this fine collection put into general usefulness and to learn that it is indeed an even more important grass herbarium than we had hoped.

THE MISSOURI BOTANICAL GARDEN

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SOME FACTS ABOUT THE GARDEN

The Missouri Botanical Garden was opened to the public by Mr. Henry Shaw about 1860. From that date until his death in 1889 it was maintained under his personal direction. Although popularly known as "Shaw's Garden" the name Missouri Botanical Garden was chosen by Mr. Shaw and he definitely indicated that he wished it called by that name. The Garden passed at his death into the hands of a Board of Trustees, designated in Mr. Shaw's will, and the Board so constituted, exclusive of certain ex-officio members, is self-perpetuating. By a further provision of the will the immediate direction of the Garden is vested in a Director, appointed by the Board. The Garden receives no support from city or state but is maintained almost exclusively from the estate left by Henry Shaw. Since 1939 many Garden Clubs and interested individuals have contributed to a "Friends of the Garden Fund" which is used in developing the new Arboretum, located at Gray Summit, Mo. The Arboretum (1) serves as a source of plants, trees and shrubs for the city Garden; (2) affords areas for gradually establishing a pinetum, a wild-flower reservation and various other features on a scale not possible in the city; (3) provides greenhouses for some 50,000 orchid plants.

The city Garden comprises 75 acres, where about 12,000 species of plants are grown, both out of doors and under glass. It is open every day in the year except New Year's Day and Christmas; week days, 8:00 a. m. until 7:00 p. m.; Sundays, 10:00 a. m. until 7:00 p. m. The greenhouses are closed every day at 5:00 p. m.

The main entrance to the Garden is at Tower Grove and Flora Place, on the Sarah bus line (No. 42). The Southampton buses (No. 80), direct from downtown, pass within three blocks of the main entrance.

MISSOURI BOTANICAL GARDEN BULLETIN

Special Number Prepared by the Rose Society of Greater St. Louis

The American Rose Society ..... William H. Bies
Roses—From One Amateur to Another ..... William S. Brock
I Hunted Old Roses ..... George D. Greene
Roses Grow on You ..... Virgil G. Baker
Nothing to Growing Roses ..... John E. Nies
Species and Old-Fashioned Roses for the St. Louis Area ..... John S. Lehmann
Rose Testing ..... Frank R. McMath
The Quest ..... Mary Lou Huggenberger
Creating a Rose Garden ..... Alma Blum
Rose Growing as a Hobby ..... Doris Hochuli

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Missouri Botanical Garden Bulletin

Vol. XLI APRIL, 1953 No. 4

THE AMERICAN ROSE SOCIETY

WILLIAM H. BIES*

The American Rose Society, a national organization, came into existence in 1899. From a very humble beginning, the Society now numbers over 13,000 members, and is the largest horticultural body in America. This membership has been brought together through a common interest—the desire to grow better roses. Today its influence is felt wherever roses are grown, and in banding together a great host of lovers of the rose, the Society has become one of the great horticultural organizations of the world.

The American Rose Society has two definite objectives: (1) the practical one—to help its members in the culture of roses, in choosing what sprays and dusts to use, what fertilizers and plants to buy, and whatever else needs to be done in order to grow good roses; (2) the higher objective—to help its members understand the uplifting influence of the garden and its roses. The rose is really a thing apart in the world of nature, its preeminence having been recognized from earliest times.

The activities of the Society are directed by a group of officers and directors elected annually by the members. They give unstintingly of their time and effort, and a paid capable staff devotes full time to the business of the Society. The Society has divided the United States into districts, each of which is under the direction of a member of the Board of Directors, and each district is subdivided into areas from which is selected a talented and qualified member to whom other members in the area may turn for advice and counsel.

The headquarters of the Society, long at Harrisburg, Pennsylvania, is in the process of being moved to Columbus, Ohio. Here amid many broad acres and beautiful surroundings the city of Columbus is erecting a permanent home for the national headquarters. Here also will be located the Society's own rose test garden along with the city's rose garden, which is to be the largest in America.

* Member of Board of Directors of the American Rose Society.

The Society has brought to many the value of growing roses and growing them well. It maintains its own test gardens in all parts of the country so that roses can be evaluated under all climatic conditions. In this connection, it may be of interest to note that such a test garden has come into being at the Missouri Botanical Garden. Through an American Rose Society Fellowship the University of Maryland is working diligently with the U. S. Department of Agriculture at Beltsville, Maryland, in evolving cures for rose diseases.

Through the "Rose Annual" and the monthly "American Rose Magazine," published by the Society, can be found the solutions to many problems which confront the grower who wishes to excel in producing fine bloom. The great lending library is a storehouse of information and rose lore. The leaflets on rose growing, variety ratings, and buyer's guide are always looked forward to by the members, and the "Proof of the Pudding," a compendium of the members' reports on varieties, is a source of great interest. It might be said that the American Rose Society is a clearing house for rose information.

At the meetings of the American Rose Society which are held twice a year (St. Louis will be host to the American Rose Society in May, 1955) the members foregather in a fellowship unsurpassed in any other organization. The programs are on subjects vitally germane to rose culture by recognized authorities. At these meetings are held the National Rose Shows and any member the country over may compete for American Rose Society trophies. At the present time the Society has assumed the training of accredited rose-show judges so that local shows may be better served in the future.

The American Rose Society is a most vigorous body desirous of carrying out its objectives both in a quantitative and qualitative manner and to bring roses to every home. The rose is one of the world's oldest flowers and has correctly been termed the "Queen" of all flowers. From spring until frost the rose reigns in beauty and gives forth an abundance of bloom unequalled by any flower. Growing roses is indeed a source of great pleasure and relaxation and handsomely rewards any effort.

Did you ever make "cinnamon roses" when you were little? About a tablespoonful of rose petals, some cinnamon and brown sugar were wrapped up tightly in heavy paper and buried under a piece of sod. The spot was marked and two days later the roses were supposed to be ready to eat. By that time the sugar would be liquified and the flavor of the roses and the cinnamon would be subtly blended with the brown sugar taste.

ROSES—FROM ONE AMATEUR TO ANOTHER

WILLIAM S. BROCK*

Pity the individual with no training or experience in plant culture who would love to start a modest rose garden. He reads the magazines, the catalogues, and perhaps a bulletin or two, but hesitates to take the plunge over what appears to be rather formidable obstacles. I fear from my own case and testimony of neighbors that a good bit of the published instructions are aimed at a degree of perfection not attainable by the ordinary mortal. That which follows is an attempt to make the path a little easier and enable more people to appreciate and enjoy roses.

Let's assume that there is only a small plot available; that there is too much shade and possibly tree roots to compete with the rose for moisture and plant food. Last week a neighbor asked me if it was possible to grow roses on the north side of the house since there was no other place available. Naturally, I told him to use the site he had. What varieties? Where to buy? When to buy? How to prepare the soil? What fertilizer to use? How to plant? How to control pests? These and a score of other questions are bewildering. Small wonder that many give up before starting.

The truth of the matter is that rose cultivation in the St. Louis area is absurdly simple. Situated between the North and the South, climate is just about ideal; far enough north to avoid effects of heat on nearly all varieties; far enough south to escape winter killing without protection, except for a few varieties; a clay soil that is well adapted or yields to treatment readily; planting either fall or spring; nor are insects and fungi notably difficult to control. In short, roses are at home in the area.

Some one asked a rose grower of years of experience what types of roses would be best for planting. The expert asked, "What kind do you like?" The answer was, "I like Hybrid Teas." The reply was, "Then that is the kind you should grow." Had the preference expressed been Climbers or Floribundas the answer would have been the same.

There are at least a score of dealers within a few minutes drive from whom satisfactory plants can be had. Why order from great distances? See the dealer nearest you; select medium to large plants; carry them home; plant immediately or if that is impossible keep them moist until weather is right. If a decision to plant is reached after it is too late to plant dormant stock there are always potted plants available up to midsummer.

Preparation of soil seems to be the greatest stumbling block for the amateur. Everywhere he reads about a deep bed with gravel, rock, or some material in the bottom to promote drainage. Of course, good drainage is

* President St. Louis Rose Society.

Planting a dormant rose

important but the average beginner simply isn't going to prepare the soil for plant reception according to the elaborate instructions one often sees. Dig a hole large enough to receive the roots; plant as nearly as possible about the same depth as the plant stood in the nursery; press the best soil available well around roots; and the plant will live. If the site is a little low, set the plant higher and make an earth mound around it for drainage.

Our clay soils need some additional plant food as well as better tilth; both can be remedied by well-rotted cow manure, a half bushel to the plant —perhaps one-third well mixed with the soil before planting, the balance around the plant above ground. Cut top canes back to 10–18 inches and let the plant and nature take care of things for a while.

Perhaps the least understood of all cultural practices is plant protection. Here again, nature is on our side. Mildew, a major scourge in some places, and Japanese beetles, to mention only a couple, are either no problem or non-existent. There are literally dozens of proprietary spraying or dusting mixtures to be had on shelves of your neighborhood store which, if applied according to direction, will control black spot, the No. 1 enemy, and an assortment of chewing insects which infest leaf and bud. A contact spray for aphids, to be applied early in the season, is available in many combinations. Spray or dust once every three weeks.

What we have been trying to say is that one does not need to be a combination horticulturist-entomologist-pathologist to grow enough roses for a

soul feast. The formula suggested will, of course, not bring either maximum production or show roses. But we have seen the share-cropper gloating over some really showy bloom on a few plants, and it is possible to plan a program so arduous that there isn't much time to enjoy the beauty of nature's bounty. Of course, there are the objections "that roses won't live with the care I am able to give them." Well, so what? Suppose they have to be replaced in three to four years! Where can one get so much satisfaction for such a small investment? Replace the worn-out plants frequently and start over. The results will be worth while.

I HUNTED OLD ROSES

GEORGE D. GREENE

Do you like to hunt around in attics, in barns, for valuable things? If you have hopes of finding a piece of Heppelwhite or a brass radiator Ford by such endeavor, you might like to join a treasure hunt for old roses. They are all around you. All you need to do is look. The identifying of them is quite another matter, but you may re-discover something valuable which will bring pleasure to yourself and to your friends. I have done this, and the reward was to have my find labeled "the most beautiful Damask Rose I have ever seen," by the renowned old rose expert, Mr. G. D. Thomas of England. Perhaps a story is in order.

It is said that if you stay with roses long enough, you will eventually find yourself planting the old roses. I found this to be true and bought all that the glowing descriptions in the catalogue of Bobbink & Atkins could induce me to spend money for. Then I borrowed two valuable books, one Bunyard's "Old Garden Roses" (now out of print, but the Missouri Botanical Garden has a copy in its library) and "Old Roses" by Mrs. Keays. This latter book, fortunately, is still in print and may be ordered from the Mac-Millan Company. I found these books stimulating and valuable. I also found the personal advice of Mr. John Lehmann and a visit to his marvelous garden of old roses indispensable for a knowledge of the subject. Mr. Lehmann is a fine rose grower and I believe is as good an authority on the subject as you will find in this country.

The Garden library also has a quarto addition of Redouté's "Les Roses." This book consists almost entirely of water-color paintings of the roses of around 1800 done by the famous French painter of flowers, Redouté, in the same way that Audubon painted birds. A botanical text in French was of little value to me; in fact, I would not have understood it very well even if it would have been in English.

A word about Mrs. Keays. Any lover of roses, or any one else for that matter, will more than enjoy reading her book. Imagine a New York school-teacher buying a pre-Civil War estate almost gone to ruin on a

tidal creek in southern Maryland! In moving a tangle of overgrown old roses out into the sun to "see what she had" the old rose bug bit her. Within a few years she had become an authority on the subject and the book will make *you* want to start.

Whenever it was possible, on trips within a hundred miles radius of St. Louis, I got in touch with friends who had farms where there might be old roses. In addition, people heard of my interest and told me about possible locations. For the most part, these were farm houses, either deserted or in the hands of people who knew little about the origin of the roses growing on their places. When they did, the information was very unscientific and might be described as, "Grandmother Jones' roses who came over the mountains on horseback." Usually I made a second trip back, after the roses were dormant, and moved them into my little bittie back-yard at one corner of the vegetable patch. By the next spring, they bloomed enough so that common roses could be eliminated.

From a lover of old roses in Jefferson City came a large collection of suckers and slips including Old Blush, Schailer's Provence, *Rosa alba* and one called Apricot. I am sure that Apricot is not the name of this rose, but it is my No. 2 find. Its growth habit is exactly like that of a little China or Monthly rose but instead of having a few pink petals in the bloom it has many many orange-apricot-colored petals. The lady who gave it to me said that it had been discovered growing on the side of the present state capitol building in Jefferson City, so we know that it is very old. This little rose grows fine from cuttings, and during this winter a number of propagations have been made from it.

From Maurice File's grandmother's little garden in Greenville, Illinois, came a valuable Baby Rambler. This one likes to grow. It grows from knee- to waist-high, and it is loaded all summer with many-petaled pinkish-white blooms that charm every one who sees it. This is my No. 3 find.

Back of every rose that we know today is that mysterious ancestor the Damask rose, but it's only there as a shadow. The Damask was such a good ancestor that it lost its identity completely. When the Monthly rose came in about 1820, the Hybrid Perpetual from 1840 to 1880, gardeners, then as now, yielded to their own desires and to certain commercial pressures and dug up the old in favor of the new. The Damask crossed readily with almost anything in the way of a rose. The crosses were sometimes better than the original, so that the Damask itself was almost entirely lost; lost commercially that is, lost along with a lot of other perfectly fine old-time roses; but many of them are not actually lost. They bloom away under adverse conditions in old farm-yards and in old abandoned homesteads where habitations no longer exist. Being of an extremely hardy disposition they are living but not thriving. Bring them out in the sun and fertilize them and you will

Rosa alba in St. Louis

see you have something very nice. Such is what happened to my Damask rose.

In Bond County, Illinois, a few miles from Sorento, a little town off the main highway, there exists a log cabin. It is known as the Old Wade Place. Nobody lives in it. It is distinguished chiefly by the fact that it is a two-story log cabin built along colonial lines and it has the finest bluegrass lawn that I have ever seen. This grass is an old strain coming half way to your knees. It is never cut, and walking on it is quite a sensation. On this little place are three clusters of old roses, and when no one was looking I took a sucker from each one. All bloomed out dutifully the following spring and two were discarded as duplicates of something I already had. The third one was very definitely something different. The blooms came in clusters. The outer petals formed a little dish something like a little glass ash-tray with turned-up edges, but the middle of the rose was simply full of a profusion of little petals that couldn't quite come out. The color was several shades of pink, and nobody who visited my garden failed to stop and want one for his buttonhole. Peculiarly enough, this type of bloom lasted for two years until the plant recovered from its previous adversity and decided to go places. This last spring every petal opened up into a sizable bloom and the rose was quite a sight to behold. In my stumbling and fumbling through Keays' book, I had erronously identified it as an old Bourbon rose and called it the Wade Bourbon. After some correspondence with Mr. Thomas in England I sent over a sucker by air-mail in the fall of 1951, and in England's delightful rose-growing climate it bloomed the first spring it was planted. I quote from Mr. Thomas, "I do not think there is any doubt that it is a Damask rose. It is the most beautiful Damask rose I have ever seen and I hope that it may be possible to find another name for it. I will certainly get in touch with you if I have any success." So out of the limbo of the past, a Damask ghost has been re-created and re-identified, and it wasn't a ghost after all.

Do you have a place on the river or out in the country? Why not have some of the old roses moved out into the garden, feed them for a year or two and see what you have. It may turn out to be the common white *Rosa alba* which is a perfectly swell rose to have around or the common pink June Rose which you can take or leave. Incidentally, I found this pink one, otherwise known as Schailer's Provence, almost everywhere I went; in fact, three houses on my block had it. However, to be an old-rose hunter you will need to be the kind of person who likes to poke around in attics delighting to find a piece of furniture or the old automobile (I have just found an old Stanley Steamer) and who gets a kick out of restoring them to active service. For me, the satisfactions have been much more important than the effort.

Hybrid Tea and Shrub roses in garden of Mrs. George W. Taylor

ROSES GROW ON YOU

VIRGIL G. BAKER

Funny thing about roses. They grow on you.

Time was when all I knew about roses was that they came by the dozen from the retail florist's shop and you ordered them out to the girl friend, or for weddings, funerals or other special occasions. They're convenient that way. You don't have to know much about them . . . or about any other flower. You never call up and say "send a cyclamen" or "how about a bouquet of Elephant's Ears?"

That's what I mean . . . they grow on you . . . you just call up and say "send roses." After awhile it gets you to thinking . . . there's a rose for every occasion. At that point you become curious. You discover there's not only one for every occasion, but there's one for almost every possible situation, as well. Then you're in for it.

You think that, if they grow on you that way, maybe they'll grow for you. So you go out and buy a rose . . . oh, just any rose . . . and you dig

Golden Climber "Mrs. Arthur Curtiss James"

Hybrid Perpetual "Frau Karl Druschki"

a hole and stick it in the ground and water it from time to time. Chances are it does all right, too. For roses are like that. With just half a chance, they'll do all right. And that's what I like about them. You can get as energetic as you like. You can fuss and fume over them like a hen with chickens. Or, you can more or less just let 'em grow, and they'll do it. They're a good lazy man's flower, and they're just as intriguing to the scientist who's an eager beaver with chromosomes and such things.

Rose growers fall into several categories, according to how you make the breakdown. For instance, there are: the novice, the amateur, the advanced amateur and the professional. The only difference between the advanced amateur and the professional is that the professional rings the bell . . . on the cash register; and the rest of us make it possible for him to do it.

Now the novice can be broken down into a few classifications himself. Sometimes he can just be broken down. But it isn't often. First in the novice class is the Green Thumb Novice. He may continue to be a novice all his life, since he gets results without any undue effort and never needs to find out how to do it by approved scientific procedure. Then there's the grasshopper novice. He tries everything without waiting to see whether what he tried first is going to work. Unless he settles down some time, he may eventually be broken. Then there's the novice who takes things seriously, who tags and calendars and catalogues. He's the only one who ever

gets to the rank of advanced amateur. But it's a funny thing about roses. The Green Thumb novice is just as likely to come up with a show prize blossom as is the advanced amateur or the professional. The grasshopper novice may come up with a prize. If he does, chances are he'll settle down, if he knows how he produced the prize winner, and become a studious amateur. The novice who goes into rose growing seriously from the first is likely to come up with a winner, sooner or later, green thumb or no green thumb.

Then, of course, there are two other kinds of gardeners that won't exactly fit into any of these categories. One of them is the lazy gardener. The other is the gardener who just doesn't have the time to work at it, much as he'd like to. For the lazy gardener and the one who hasn't the time, the rose still is the flower of flowers. For a Paul's Scarlet Climber out against the garage will grow and grow and bloom and bloom with very little attention. And old-fashioned roses, like Harison's Yellow and some of the Pillars and Ramblers, are as healthy and as rugged as the country. Speaking of the country, even the farmer who doesn't like to build fences can do it with roses . . . *multifloras* . . . which get thick enough to hold stock, and need little or no attention year after year. Not to mention the Hybrid Perpetuals and the Floribundas for general gardening, which give a lot of bloom in their seasons for the little work they require!

It's really only the Teas that get touchy and have to be petted and pampered; but not all of them really. But it's better for the novice, green thumb or no, to start with just a few of the tried and true that supply deep color tones for accents in the garden and do well even when not babied like a kitty-cat on a satin pillow. Radiance (it's pink) or Red Radiance, which the more advanced gardeners dismiss as a mere nothing, is a good rose to start with. It will do all right around this area when others won't stand the gaff of ineffectual handling, hot, dry summers and uncertain winters. Then there is Crimson Glory for a good deep red, Lowell Thomas in yellow, and one of the sturdiest with mixed colors is Peace, a relative newcomer.

Pick no more than half a dozen plants to start, especially if your time's limited or your space restricted, for often even the most beautiful show roses come out of the small and unpretentious gardens that don't create more work than the gardener is equipped to undertake. It's really very simple. Dig a hole, spread the roots out over a little mound of rich earth at the bottom and fill in solidly around so that no air spaces are left to dry the roots out before they can get a good hold on the soil. Water and stand by. A little dust or spray later on will help them when the bugs show up, but don't get too enthusiastic and throw on everything. Take it easy on fertilizers or liquid feeds and such stuff until the plant gets over the shock of

being moved. Later on, feed it a little with fertilizing material, but even then don't overdo it. Like all food and medicine, because a little is good, it doesn't follow that too much is better. Most of all, don't get so involved in the technicalities that you forget to enjoy the beauty of the flower. There's no profit, even to a professional, when it ceases to be fun.

NOTHING TO GROWING ROSES

JOHN E. NIES

Any one can grow roses but to grow good roses you need to start with good plants and have information available to follow through. Speaking from experience, for the first ten years I just planted rose bushes and found each spring I had to replace a large percentage due to many causes of which I was unfamiliar. Now as a member of the Rose Society of Greater St. Louis, which is affiliated with the American Rose Society, I have available information as to those roses that are the best growers, as well as good bloomers. This is obtained through test gardens (one of which is in the Missouri Botanical Garden) throughout the United States where the roses are carefully checked and the results reported to a central bureau which compiles the information into what is called "Proof of the Pudding." This rating guide, as well as "a guide for beginners on growing roses," is available from your local society *gratis*. Also, your local Rose Society has programs for members, starting in January, in which experts explain the proper preparation of the soil, how to choose a good bush, proper planting and pruning, the various needs such as dormant sprays, sprays to control insects and sprays to prevent fungus and black spot. Then just prior to the Society's Rose Show, usually held the last week of May, there is a program on exhibiting, with a professional explaining how to arrange roses. Also the "Voice of the Rose," monthly publication of the St. Louis Rose Society, contains helpful cultural notes.

In addition to the information acquired through the various sources already mentioned, there are numerous books available but the true rosarian still likes to do things that are considered unorthodox. I believe each of us must learn to know his own garden and conditions. Even my wife and I don't agree on insect control—she likes spray (Triogen) while I like dusting, so we do both alternately with good results.

I have numerous beds, about 250 bushes of 75 varieties, and I find the worst enemy to growing good roses and one of the hardest to control is tree roots. I have found roots from some trees will reach 25 feet or more, and the only way to partially control this condition is to use a long trench-digging spade, forcing it down to its full depth, completely around the bed several times a season to cut the offenders. One other thing I try to avoid

is getting foliage wet when watering. To prevent this, I build a levee of earth around my beds so that in hot weather I can flood them at the roots and the water will soak in and not run off.

I like to plant roses among low-growing evergreens such as yews; it gives an attractive effect. I also plant ivy on the ground which improves the looks of the beds as well as keeping the ground moist and helping to control weeds.

A small rose garden at the Missouri Botanical Garden

A rosarian loves his roses and is always willing and anxious to give information to those who seek it; in fact you will find every one is on the same level when talking roses, and friends are made and kept thereby. Dorothy Gurney's verse appearing on the Bok Singing Tower of Florida can apply to rose lovers:

"The kiss of the sun for pardon
The song of the birds for mirth
One is nearer God's heart in a garden
Than anywhere else on earth."

The large bright-colored fruits of *Rosa rugosa* can be used in making a garnish for fruit salad. If one works carefully the seeds can be scooped out and replaced with cream cheese or some such mixture.

SPECIES AND OLD-FASHIONED ROSES THAT DO WELL IN THE ST. LOUIS AREA

JOHN S. LEHMANN

Of the once-blooming species shrub roses, with single flowers, that do well in the St. Louis area, the Sweet Brier, *Rosa altaica*, and *Rosa Hugonis* are among the most desirable. All are hardy and require no special attention. The Sweet Brier is about six feet tall and has small pink flowers. However, its most distinguishing characteristic, which has made it a favorite from the days of Shakespeare up to and including today, is the pleasing fragrance of its foliage. *Rosa altaica* with white, and *Hugonis* with yellow flowers, are about four or five feet tall, and are among the earlier-flowering roses.

Another good, hardy, early, once-blooming, shrub rose is Harison's Yellow. It is about six feet tall and spreads by suckering. It is covered in early spring with small, double, well-shaped, bright yellow, fragrant flowers. In my garden it is habitually the earliest good double rose.

Rosa alba, *R. centifolia*, *R. damascena* and *R. gallica* all have semi-double or double flowers, but are not remontant. They have been cultivated in the gardens of Europe for centuries, going back to the Greeks and the Romans, and were brought over to America by the early settlers. They are all hardy in this climate.

Rosa alba is a big vigorous shrub about eight feet tall, with handsome bluish-green foliage and good-sized, semi-double white flowers with showy yellow stamens. Hybrid *albas*, such as Maiden's Blush, are about six feet tall. The foliage is not as bluish as that of *Rosa alba*. The flowers are fragrant, double, about four inches in diameter, and in various shades of pink.

Rosa centifolia is a much smaller, less vigorous plant than *R. alba*. It is about four or five feet in height and produces globular, very double and very fragrant, pink flowers. Moss roses are a division of *Rosa centifolia*, resulting from the tendency of *centifolia* to produce bud sports. The principal difference between Moss Rose and ordinary *centifolia* is that the Moss Rose has a moss-like growth on the sepals, calyx, and stem. This growth is the result of multiplication of the glands. It is decorative and adds to the fragrance of the flower. Moss roses also generally have more prickles all over the plant than the ordinary *centifolia*. The different varieties of Moss roses differ greatly in both the quantity and character of the mossiness. Two of the best are Crested Moss and Old Pink Moss.

Mme. Hardy, a hybrid Damask and a little more vigorous in growth than *centifolia*, produces fine, large, double, fragrant white flowers, probably the best of the old-fashioned white roses. Another good hybrid Damask is Marie Louise, with double, deep pink, fragrant flowers.

Shrub Rose "Harison's Yellow"

Bourbon Rose "Hermosa"

Rosa gallica is low-growing, with bright pink semi-double flowers about four inches across, and showy yellow stamens. *Rosa gallica versicolor*, also known as Rosamundi and sometimes as York and Lancaster, is identical with red *gallica* except that the petals are striped a very bright red and white. Fanny Bias, 1819, is a pink hybrid *gallica*, very full and fragrant.

Early in the nineteenth century French and English hybridists started crossing the ever-blooming roses from China with the European roses. This eventually gave us the Bourbon roses, combining the remontant characteristics of the Chinese roses with the vigor and hardiness of the European roses. Four of these old Bourbon roses are still good and do well here. Zephirine Drouhin (Bizot, 1868) is a thornless Climber with large bright pink, fragrant flowers. Souv. de la Malmaison comes in two forms, the climbing form and the bush form. The climbing form is hardy here but is once-blooming. The bush form is remontant but requires winter protection in this locality (I have not grown it). The climbing form is very vigorous and is covered in the spring with very double, quartered, flesh-pink flowers of exceptional fragrance. Louise Odier, 1851, has medium-sized, bright pink, semi-globular, very fragrant flowers. In growth it is about like a Hybrid Perpetual. Hermosa, 1840, shorter in stature than Louise Odier, has small, globular, fragrant, pink flowers. Both Louise Odier and Hermosa are steady bloomers through the summer and fall until stopped by cold weather.

Zephirine Drouhin, although remontant, is a somewhat shy bloomer in the summer and autumn.

Of the Hybrid Perpetuals, Paul Neyron, 1868, is old enough to be classed as old-fashioned and is one of the best. The stems are practically thornless. The flowers are very large, a deep rose-pink and fragrant. It is remontant and produces fine flowers in the late summer and autumn.

Climber "Pigmy Gold" in Frank McMath's garden

ROSE TESTING

FRANK R. McMATH

With frontiers fast fading beyond the horizon, exploration of new lands and countries becomes increasingly difficult, so those of us who feel the urge to pioneer must turn our efforts to other fields. What greater thrill could one have than to see unfolding a new rose of a different color, a larger size, more fragrance, or perfection of form: a Crimson Glory, a Fashion, or a Peace! These are rewards of pioneering or testing new roses; it is thus I show my devotion to the "Queen."

Of course, all is not success; there are many failures but compared with those of the hybridizers or originators, who may get one good rose out of 10,000, the disappointments are few. True, too, is the fact that you cannot test many of the 500 odd new varieties that are placed on the market each year. But the satisfaction, in this competitive world, just in having a newer or better rose than your fellow rosarians is its own reward. This is the driving force that causes me to slave in the garden, to spray, to cultivate, to fertilize when I might be reclining in the shade of a tree.

Among testers there is a divergence of opinion as to how to care for these new roses. Some plant and ignore them, to live or die according to nature's whim; some give a minimum of care; but I strive to give mine only the best of care and attention and, when I have achieved some success, to share them with others through giving bouquets and having visitors to my garden.

The climate and soil of our country are so varied that often roses which do well in one locality do not do well in others. For this reason, hybridizers, originators or introducers of new roses from other continents desire to know how well their roses will perform in order that they can estimate how great will be the market for them. There is, of course, the All American Rose Selection test gardens (supported by the commercial growers), scattered throughout the country, that test roses for two years, grading and picking the several outstanding roses for each year. But the best testing is that done by amateurs, as most of the roses are grown for and sold to amateurs. There are many individuals and societies like our own trying out roses in test gardens, but probably the best organized amateur test program is that of the Men's Garden Clubs of America. This program is headed by our American Rose Society President, C. Eugene Pfister, and carried out by one representative from most of the nearly 150 affiliated clubs. Gene contacts the introducers, so as to provide a source of plants which are sent to the individual tester, under license. The plants remain the property of the introducer who may ask for their return or destruction after the test program is over. Gene also makes up a detailed report blank on which the roses are

rated periodically throughout the season and then graded at the end of the year. Floribundas and Hybrid Teas are tested for two years and Climbers for three years. These testers also try out insecticides, fungicides, fertilizers, and garden gadgets. Our St. Louis Society has Mr. William Sisco as representative of this program, and the writer represents the Webster Groves Men's Garden Club.

Hybrid Tea "Symphony" in Frank McMath's garden

The roses we receive are usually only numbered and are planted and cared for as our other roses. Later, generally at the end of the growing season, we are told of the name by which the rose will be known and are given a release for publication purposes.

Thus my testing experience, which I also give to the American Rose Society through the "Proof of the Pudding" in the American Rose Society Annual, leads me to advise that Ma Perkins is not as prolific a bloomer as Fashion, nor is Vogue; that Remembrance and Buccaneer show promise, as

do several still under number, and that Pigmy Gold is a wonderful border rose. This year I will be trying some of Brownell's ground-cover roses and one of his ever-blooming Climbers of which he says he has thousands.

We testers not only do a service to the introducers but also to every amateur rose grower, as we can give advice on new varieties that will save time and money. Call on us, we are always glad to talk roses and enjoy sharing our gardens with you. Thus as rose testers we are doing our small share in the search for that will-o'-the-wisp of the future—the ultimate, the perfect rose.

THE QUEST

MARY LOU HUGGENBERGER

The "Rose Hobbyist" is usually one who first plants a few roses and by chance has rather good luck. One successful season results in "happy enslavement" for the unsuspecting grower. As his rose appreciation evolves, soon the hobbyist begins "The Quest" for knowledge concerning the rose.

The rose has been the favorite flower of gardeners for thousands of years. Hundreds of forms, both natural and hybrid, now exist. Consequently, the rose qualifies as being one of the most complex races of plants in cultivation. Very little scientific history of the rose was recorded or studied before the nineteenth century. Most of the early history comes to us as incidental information, gleaned from literature and history. According to geologists, the rose is at least thirty-five million years old, and they suggest that it probably is about seventy million years old. Fossil roses have been found on three continents of the world, Asia, Europe, and North America. Two fossil roses have been found in the United States, one in Colorado and one in central Oregon.

When civilized man began to record his history we find the rose had already played an important part in his life. It appears to be the oldest cultivated flower. About 1200 B.C. Nebuchadnezzar built the fabulous Hanging Gardens of Babylon in a furtive effort to allay the homesickness of his Median bride. It has been estimated that 300,000 roses were included in the original planting. The Bible mentions the rose many times but does not place it in the Garden of Eden. The Koran places it in the Garden of Paradise, and it grows in the gardens of the Taj Mahal, laid out to its exact design. Less than a mile from the Taj Mahal stands the ruins of the palace of the Moguls. Nur Mahal, famed Mogul Princess, used great quantities of rose oil in the fountains of the palace, and everywhere she went she left an aroma of roses. Legend tells us that the process of making attar of roses was decreed sacred and limited to her exclusive use during her lifetime.

The Persian poets speak of roses repeatedly. Hafiz extols their beauty in more than one hundred poems, but it is Omar Khayyam, the tentmaker, that we know best. Cuttings of the Damask rose from his grave have been planted on the grave of Edward FitzGerald, the great translator of the equally great poem, "The Rubaiyat."

The rose takes a prominent place in the literature and art of both Greece and Rome. The Roman scientist, Pliny, lists many rose varieties common in southern Italy during the first century. He mentions that the true rose aroma is strongest when the soil is dry, and this bit of cultural information is quite correct. Nero is said to have spent an amount of money equal to 100,000 dollars to secure rose petals to strew around the palace for one royal feast. It is probable that the lavish use of rose petals was one means to camouflage the stench that wafted up from the city.

Certainly the rose was prized in the cradle days of the Aryan race. The Crusaders carried the Damask rose back to Europe. The spice ships brought many forms of the Chinese rose. The most famous of these, Old Blush, is the foundation of our modern monthly roses. It is of Old Blush that Thomas Moore sings in the "Last Rose of Summer."

The rose has been used as a symbol of almost every noble human endeavor. It has been and is used in the heraldic emblems of nearly every ruling family. It has symbolic significance in every religion known to man, and it has been used as a token of love and respect through the centuries, by Orientals and Caucasians alike. Over a period of forty centuries, peoples of many cultures gathered together, cultivated, and used the rose. They were satisfied to use them "just as God made them" and made little effort to change their form.

The evolution of the rose had its beginning in France under the guidance of Empress Josephine. Certainly, the historians have displayed the universal weakness of dwelling too much on the faults of the great. This powerful woman inspired the first real scientific effort to improve the rose. Her interest in botany and her development of the historic garden of Malmaison is a fascinating story for any rosarian. Josephine, who had such great influence, gathered together the greatest botanists of her era. The first scientific rose hybridization was carried on at Malmaison. The great artists were encouraged to paint the rose. The famed paintings of Redouté were done at her command. Because the nations of the world were courting the favor of Napoleon, they sent specimens of rare plants, particularly roses, to his empress. All ministers of state were instructed to send botanical samples. Because Josephine loved the rose, roses became the style. The era of the modern rose had begun.

Mildew

Black spot

Aphis

Caterpillars

DISEASES AND INSECTS

The quest for rose lore is never finished. The search must include the records and relics of every civilization. Truly, the rose is universal. Man's culture, religion, and history may differ but the rose is always a part of his story. May it ever be so!

"Oh, no man knows
Through what wild centuries
Roves back the Rose!"

CREATING A ROSE GARDEN

ALMA BLUM

Today, nearing the date line which signifies the real entrance of Spring, I shall try and state a few facts which prompted me to create a rose garden.

The year 1926 found me in France. As we all know, the titled ladies of the Napoleonic times found great pleasure and art in creating lovely rose gardens, many of which are still in existence. After enjoying them, I came home with the solemn resolution that some day I would create for my own delight a rose garden. Never did I think when we moved in our present location on Longfellow Boulevard, that directly in back of our home would be the spot to fulfill my secret desire. There stood a dilapidated building complete with a bat-infested garage. After much inquiring, we contacted the owner in Kansas City, and this long-uninhabited home was acquired. Then started the real task of dismantling, so you can see that I did start "from the ground up."

For a garden plan, I utilized the house foundation and immediately started filling up the basement and creating the proper ground for the rose beds. May I say now, after seven or eight years of promoting my rose garden, that too much care cannot be exercised in preparing the soil to encourage the roses. However, sometimes one must learn by actual experience, which was my fate. I utilized the stone salvaged from the old house as flagging for the garden paths, drew a plan of what I thought would appear to be a semi-formal rose garden, then proceeded to plant the roses.

Planting was indeed a gigantic task, and much advice was sought from the members of the Rose Society of Greater St. Louis as to the proper varieties to encourage in this climate; this, too, cannot be taken too lightly if one expects to get the best results. When one considers the many thousands of varieties, the placing of the beds is of paramount importance. While I have not entirely achieved what in my mind are the best results, I am constantly gaining more knowledge as to the amount of care each variety of rose expects and I find the solutions of problems unfolding. As for planting, I have until now always considered spring the proper time, but last fall, after attending the Rose Convention in Harrisburg, Pennsylvania, I became con-

Hybrid Tea rose in March
Remove weak and dead canes and sucker at left

Proper pruning cut above a bud

vinced that fall has its opportunities. Only today I uncovered the bushes planted last fall, and am experiencing new thrills and adventures in this phase of rose growing. My garden, while being located in the heart of busy St. Louis, does not suffer too much when compared with the county gardens, and the roses, if properly sprayed, attain the same growth.

Several years ago I planted a bed of California Angels Mateu roses and this year I am planting a bed of Editor McFarland roses (an Eastern rose), so we shall see what will be the outcome of "East meeting West" in a rose garden of St. Louis climate.

Rose-petal marmalade is a common delicacy in the Near East. Take blooms of old-fashioned heavy-scented varieties. Pull off an entire rose and with the other hand snip off with a pair of scissors all the whitish tough bases of the petals. Buy crystals of citric acid at the drug store. Working with a small basin of petals, rub the petals and the crystals back and forth quickly between the palms of the hands. Add water and boil up quickly. Flavor with sugar and use enough Certo to make the mixture jell. If the resulting juice is too tough the petals need to be rubbed longer and bruised more extensively. One should use enough citric acid to make it almost as tart as crab-apple jelly. The attractive rose-red color sometimes fades near the surface but the flavor is not affected.

ROSE GROWING AS A HOBBY

DORIS HOCHULI

I have adopted the rose as my favorite flower. The pleasure of a garden, my own personal garden and not one made for show, is that it reflects my tastes and ideals and the flowers that are my companions. As every one who starts with roses, I too started with Hybrid Teas, later became interested in old-fashioned roses, Climbers, Floribundas, Polyanthas, and Miniatures, but now I have planted and replaced many of these with some I thought more beautiful. When visiting our members' gardens I always find a "must" for my garden.

Every rose has individuality. If one hangs its head I will not condemn it as it reminds me of a lovely lady nodding her head in greeting. Some climbers with weak necks, I like, as I consider their looking down on you from a trellis a definite advantage. Why plant those climbing roses bearing upstanding flowers that only the birds can see?

Rose growing can be as difficult as you want to make it. If you start out with reasonably good soil, proper planting, and with little care they are most tolerant. On a morning walk in the garden, with pruning shears handy, I cut a few beauties for the house, and since I can see my roses from the house I leave many on the bushes. Always there are spent blooms which are cut off and put in a paper sack to burn. My spraying or dusting, feeding, and watering program takes some time, but it is time well spent as there are no other plants with the long-blooming season that the rose possesses—from early spring to late fall. I spray or dust after each rain, thereby keeping the leaves covered always. I prefer dusting, as I can do that in the morning when the air is still and leaves are a bit moist and the weather not as hot; if there are no rains I watch for heavy dews, for they too wash off the spray or dust material. The aphids and other insects that might be nibbling I get by using an all-purpose material. I feed once in April, May, June, and August, and when there is no rain I water deep once a week, using a soil soaker.

The pleasures of rose growing are boundless. Once you get acquainted with how much roses can give you for the little care they demand, they will become trusted standbys in your garden.

The Garden has one or two rare old-fashioned varieties in its collection. Coquette des Alpes, an early hybrid which apparently has some *Rosa alba* in its make-up, has done well with us for years. Its flowers are small but a clear flesh-pink and they bloom well in late summer and fall. So far as we know it is not in any other collection.

SOME FACTS ABOUT THE GARDEN

The Missouri Botanical Garden was opened to the public by Mr. Henry Shaw about 1860. From that date until his death in 1889 it was maintained under his personal direction. Although popularly known as "Shaw's Garden" the name Missouri Botanical Garden was chosen by Mr. Shaw and he definitely indicated that he wished it called by that name. The Garden passed at his death into the hands of a Board of Trustees, designated in Mr. Shaw's will, and the Board so constituted, exclusive of certain ex-officio members, is self-perpetuating. By a further provision of the will the immediate direction of the Garden is vested in a Director, appointed by the Board. The Garden receives no support from city or state but is maintained almost exclusively from the estate left by Henry Shaw. Since 1939 many Garden Clubs and interested individuals have contributed to a "Friends of the Garden Fund" which is used in developing the new Arboretum, located at Gray Summit, Mo. The Arboretum (1) serves as a source of plants, trees and shrubs for the city Garden; (2) affords areas for gradually establishing a pinetum, a wild-flower reservation and various other features on a scale not possible in the city; (3) provides greenhouses for some 50,000 orchid plants.

The city Garden comprises 75 acres, where about 12,000 species of plants are grown, both out of doors and under glass. It is open every day in the year except New Year's Day and Christmas; week days, 8:00 a. m. until 7:00 p. m.; Sundays, 10:00 a. m. until 7:00 p. m. The greenhouses are closed every day at 5:00 p. m.

The main entrance to the Garden is at Tower Grove and Flora Place, on the Sarah bus line (No. 42). The Southampton buses (No. 80), direct from downtown, pass within three blocks of the main entrance.

MISSOURI BOTANICAL GARDEN BULLETIN

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COVER: CATINAT, one of the "Lamartine Hybrids." Photograph by Paul A. Kohl.

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Missouri Botanical Garden Bulletin

Vol. XLI MAY, 1953 No. 5

THE WORLD'S BIGGEST FOOD CROP

HUGH C. CUTLER

The potato is not only the world's most important vegetable but the annual harvest of potatoes is larger and heavier than that of any other food crop. In the period 1946-48 the annual world potato production averaged slightly less than eight billion bushels as compared to approximately seven billion bushels of rough rice or six billion bushels of wheat. However, the actual calorie content of the cereals is greater because the potato contains about 70 per cent water and only 2 per cent protein and 14 to 19 per cent starch. The potato is a native of South America but about 90 per cent of the world's crop is now grown in Europe, about a third of it in Russia. Potatoes grow especially well on the light and acid forest soils of northern Europe. Only 5.5 per cent of the world's potato crop is harvested in the United States but we still are the largest producers in the New World and usually grow far more than we eat.

Our common cultivated potato *(Solanum tuberosum)* probably originated in Chile, Bolivia, or Peru, where the diversity of size, shape, color, flavor, and texture in the cultivated tubers and the number of edible wild kinds is greatest. Potatoes have been grown in South America for a long time. Representations of potatoes from ruins in north coastal Peru (figs. 1 and 2) show that as far back as a thousand years ago many kinds were known. Today the Indian farmers in a single valley in southern Peru may grow as many as eighteen different kinds of cultivated potatoes belonging to four or more distinct species, may harvest several wild species which occur as weeds in their fields and near them, and may know that three other wild potatoes with edible tubers grow in their valley. In the high Andes the potato is still the principal food above the altitudes where corn will grow. Part of the highland harvest is dehydrated by methods used before the times of the Incas. Small potatoes are frozen at night and then, after they have thawed in the sun, pounded with bare feet to press out the water released from cells ruptured by ice crystals. This process is repeated until potatoes

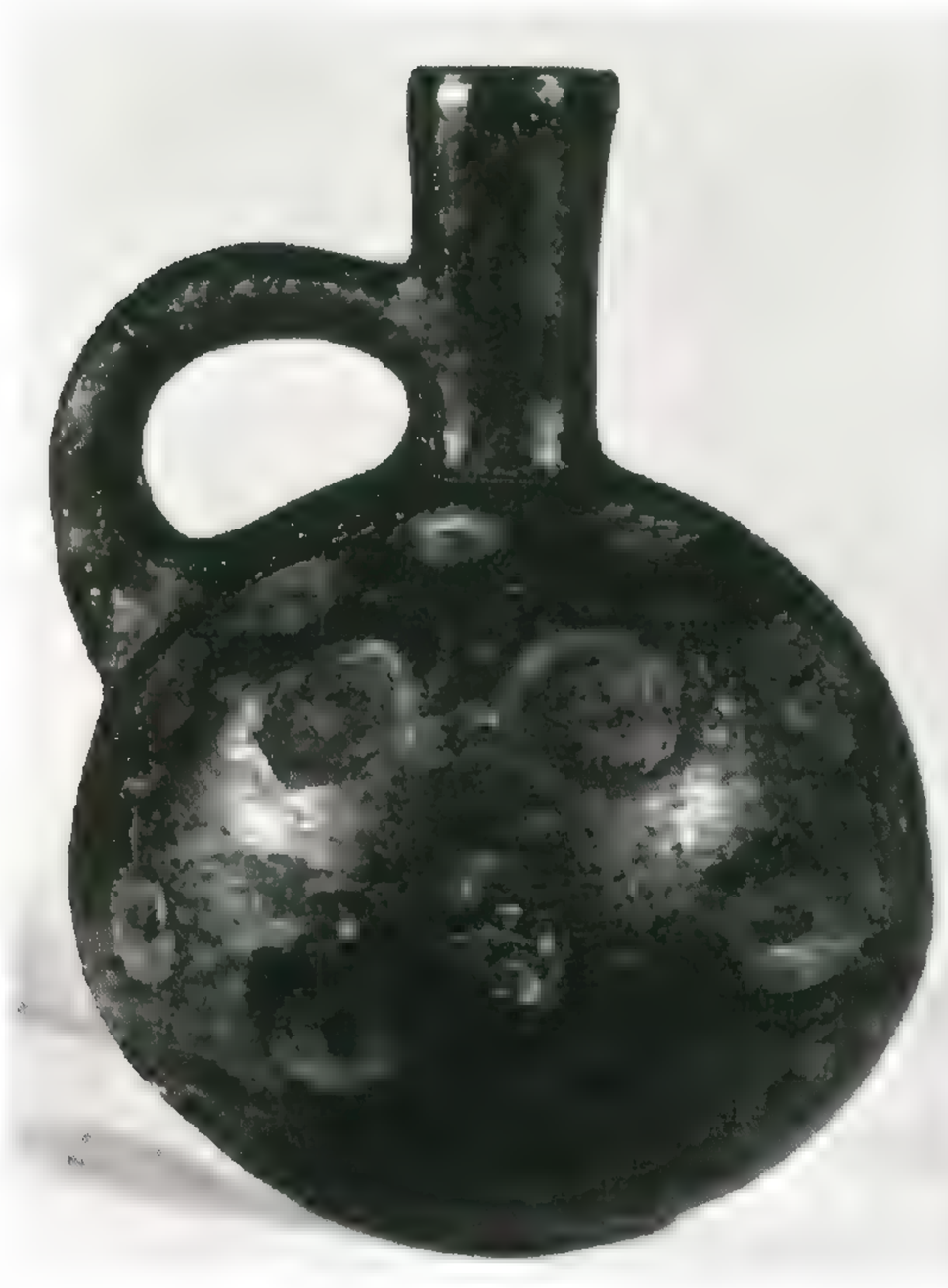


Fig. 1

Fig. 2

Chimu period pottery, representations of two potato varieties. Excavated in north coastal Peru.

are dry enough to store safely. Wild potatoes with edible tubers grow from Colorado to the south of Chile but there is no reliable evidence that they were used before the conquest except for the occasional gathering by Pueblo Indians of a kind *(Solanum fendleri)* with very small tubers.

Many attempts to grow the Andean potatoes in the United States and Europe and to use them in hybrids to introduce superior qualities and greater disease resistance have failed because the potato is sensitive to changes in day length. Varieties adapted to the short summer days of low latitudes seldom produce tubers or flowers with our long summer days. Some of the potato varieties we grow produce fruits so seldom that when one is seen today it is confused with the very similar young fruit of the tomato (fig. 3), and newspapers print stories of a tomato-potato hybrid. While the probability of such a hybrid occurring naturally is quite remote, it is possible to graft tomato branches on a potato plant and harvest potatoes and tomatoes from the same plant. It is even possible to add a tobacco cutting to the plant and harvest tobacco leaves.

About 1580 the potato was grown in Europe as a garden novelty. We do not know who was the first to introduce this vegetable but Sir Walter Raleigh's ships did not bring it from Virginia. The tubers found there are groundnuts, or *openauk (Apios tuberosa)*, which the Indians harvested from

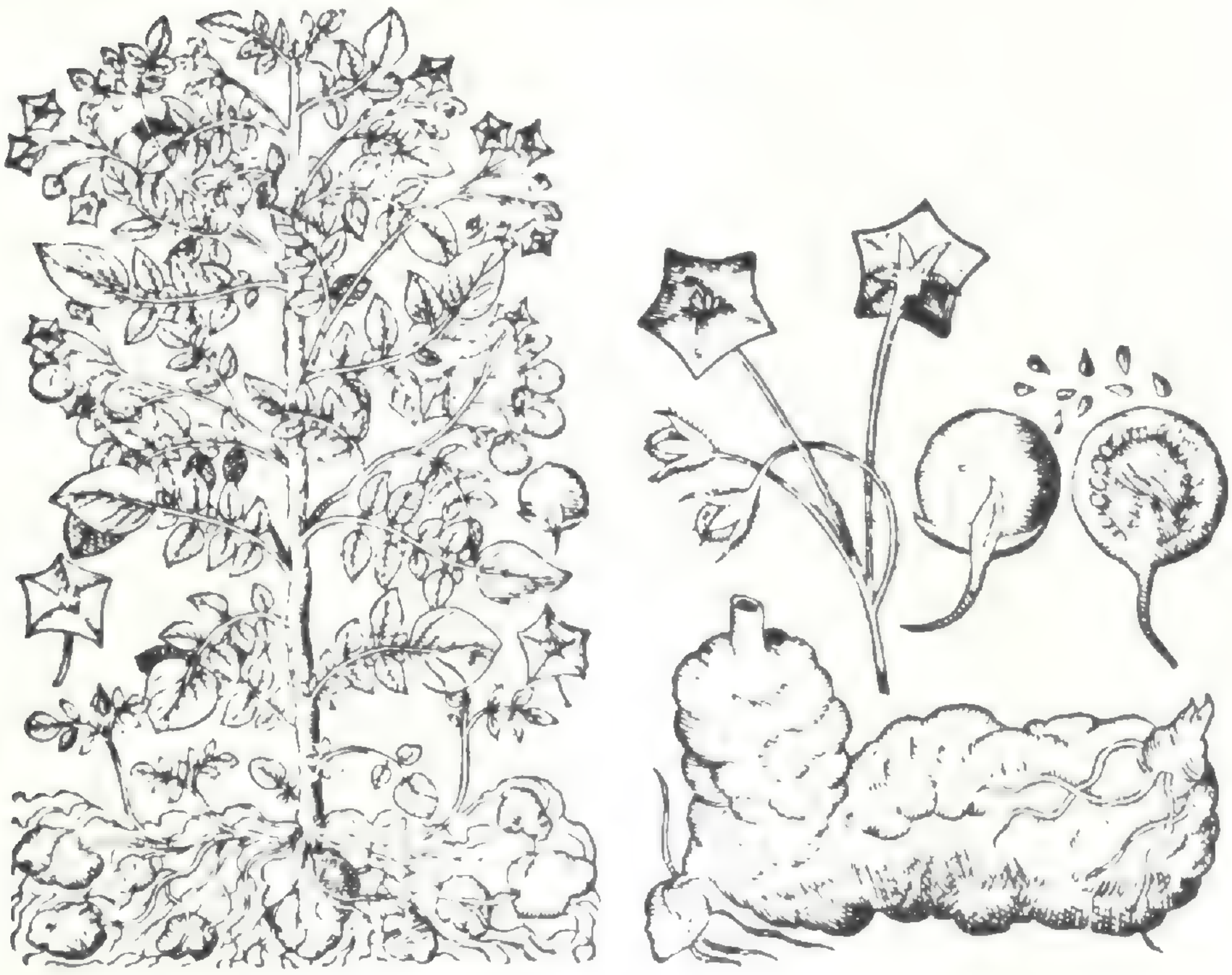


Fig. 3

Potato plant bearing flowers and fruits. Illustration from Bauhin's *Prodromos Theatri Botanici* (1620), a copy of which is in the Garden library.

wild plants and occasionally cultivated. Potatoes may have been introduced into Europe several times, for English and Spanish ships often stopped in Chile and Peru to load native crops as provisions. In Germany laws were passed to compel the people to plant potatoes, for it was soon discovered that the harvest was excellent in relation to the amounts of labor and land used. In France Parmentier successfully used a ruse to entice people to grow them. His field was guarded during the day to give the impression that potatoes were very valuable but at night the guard was withdrawn and the people were given an opportunity to steal tubers for planting. The King wore potato flowers in his button-hole, Marie Antoinette wore them in her hair, and the potato became accepted socially.

In Ireland potatoes were grown before 1663 and, since they can produce more food than grains in certain kinds of soils, potatoes soon became the national food. The population of Ireland had increased rapidly, from two million in 1785 to more than eight million in 1845, the year the potato story in Ireland turned to a tragedy. Disease wiped out practically the entire crop and more than 300,000 people died in the famine which followed. Every one who could afford to buy a ticket left for the United States. This was the first of several tides of immigration which swept Irishmen to our

country. Disease-resistant varieties of potatoes were soon selected and spraying mixtures developed so that the Irish could grow potatoes again. The potato blight is caused by a fungus (*Phytophthora infestans*) and is usually controlled by copper-containing sprays such as Bordeaux mixture.

In the United States potatoes have been grown on a slowly increasing scale since the middle of the 1700's. About 350 million bushels were grown in 1952. Before 1945 about 80 per cent of our potatoes were used as food, about 13 per cent for replanting, and the remaining seven per cent fed to livestock or lost by decay. Some starch was made, usually from cull potatoes or the surplus in years when all the harvest could not be marketed. Most potato starch is used for sizing in the textile and paper industries, about 25 per cent in foods. In Europe a considerable portion of the potato crop is fed to animals or converted to alcohol.

Most of the new varieties of potatoes in the United States have been developed by selection from seedlings. Older varieties which once formed the bulk of the crop are gradually being replaced by ones with consistently high yields and greater disease resistance. Early potatoes are grown in the southern states but the major crop is produced in the North. Maine and Idaho are the principal producers, with harvests of about 46,000,000 and 38,000,000 bushels respectively, in 1951, but many other states produce 10,000,000 or more bushels. Idaho is far from the principal potato markets but the preference for the dry baking type grown there, usually the Russet Burbank variety, enables Idaho to compete with other areas in spite of higher transportation costs.

Potatoes are members of the plant family Solanaceae, are related to tomatoes, red peppers, tobacco, and egg plants, and attacked by the same diseases. For this reason potatoes should not be planted on land previously occupied by one of these crops or near fields of these related plants. Planting is done with small pieces of the tuber which include one or more of the "eyes", or with small tubers. As the plant matures the stolons, or underground stems, enlarge at the outer end to form the tubers. Potatoes are usually harvested, by machines on the larger farms, after the tops have begun to dry. A new development in potato growing is the use of various chemical dusts and sprays, flame throwers, and mechanical beaters to kill the potato vines shortly before the harvest and thus hasten the maturation of the tubers.

Better varieties and improved practices in planting, fertilizing, and spraying have increased, between the periods 1935-39 and 1947-51, by 95 per cent the amount of potatoes harvested from an acre of land in this country. This is more than twice as great as the increase made in average corn yield during the same period and three times as great as the average increase in

yields per acre of all crops. Potato yields continue to improve rapidly, while gains made by other crops have been relatively small during the past two years.

Unfortunately, while potato yield per acre has nearly doubled in recent years, per-capita consumption has decreased so that now the average person eats about half as many potatoes as he did forty years ago Many families stopped buying potatoes in recent years because they considered prices too high and the labor of washing and cleaning potatoes unpleasant. Farmers have grown more potatoes than they could sell and government subsidies were so unsuccessful that they finally were dropped. In 1950 our 440 million bushel production was 100 million bushels more than we required. A large part of the excess was completely wasted because the potato contains too much water to be transported economically. While prices on potatoes were maintained by government support and subsidy, some grocers in eastern towns sold Canadian potatoes because these cost less, even after all the shipping and import fees were paid. The most startling area in 1950 was Aroostook County, Maine, where 15 per cent of the United States potatoes are grown. Acreage was only half what it was four years earlier, but the 1950 harvest was greater because yield had been raised to 475 bushels per acre. (The United States average was 238 bushels.) Less than 40 per cent of the 1950 Aroostook County crop was sold on the commercial market.

It is unlikely that potatoes will ever return to prominence on our tables, yet they are a healthy and economical food. They contain a good amount of vitamin C and certain minerals and can be readily stored for short periods and easily prepared. Potato chips, now a 250-million dollar business which prepares 8 per cent of all potatoes eaten in the United States, may utilize more and more of our excess crop. And there is the grave possibility that future population pressure may so increase land values that only foods with a high yield per acre, like potatoes, can be purchased by people with modest incomes.

Never within the memory of most St. Louis gardeners has there been such a spring. It may have been hard on garden parties but it has been wonderful for gardens. After a mild winter, warm weather came early. The Ozark Witch-Hazel bloomed in January. Daffodils were well in bloom by the end of February. About then it turned cool and has been coolish and dampish a good deal of the time ever since. There has never been such a season for lilacs which ordinarily are greeted with hot dry winds before they are part way through their blooming season. Northerners accustomed to the cool and misty springtimes which are best for many of our garden favorites have revelled in the lilacs, the wood-hyacinths, and the primroses.

LAMARTINE LILACS FOR ST. LOUIS

EDGAR ANDERSON

Outside of a very narrow belt along the Missouri and Mississippi Rivers (where the rich loess soil simplifies many gardening problems), the so-called "Lamartine Hybrids" are the only thoroughly satisfactory lilacs for the St. Louis gardener. These are a series of named varieties produced by the Lemoine family of Nancy, France, by crossing the common lilac with a closely related Chinese lilac, *Syringa oblata* var. *Giraldii.* From the latter parent they acquire an earlier season, a more open panicle of flowers, a distinctive darker cast of color as they come into bloom, and a lustier habit of growth. To be precise, they should be catalogued under *Syringa* × *hyacinthiflora*, the recognized name for hybrids between these two species, but the variety LAMARTINE was the first of these hybrids to become generally known, and many gardeners have fallen into the easy habit of referring to the whole set as the "Lamartine Hybrids." It is natural to do this since most of the single-flowered varieties introduced by Lemoine look pretty much alike, and even an expert could be pardoned for not always being certain just which one of the set he has before him.

Of these several varieties, DESCARTES, CATINAT, and LAMARTINE seem to have done the best in St. Louis though MIRABEAU and PASCAL have also done well. They are practical for most St. Louis gardens for a variety of reasons. In the first place, they are true hybrids and have more hybrid vigor than ordinary lilacs. They come through hot summers and spring droughts better than the ordinary sorts, partly because of this vigor, partly because of their Chinese inheritance. Even more important is the fact that they bloom earlier than other lilacs. This year CATINAT was in bloom by April first, and it can always be depended upon to bloom in April. The "Lamartines," therefore, escape much of the heavy heat which usually strikes St. Louis before the comon lilac is out of flower. Hot weather and hot drying winds are hard on lilacs. The temperatures in the upper eighties or even in the nineties, combined with dry winds from the Southwest, can sear the opening flowers of the common lilac and cut short their flowering period. The "Lamartine hybrids" flower earlier (how much earlier depends upon the season), and they will frequently be on their way out of flower before the first hot breaths of summer strike our gardens.

It is true that the "Lamartines" frequently flower so early that they are caught by the frost. This is offset not only by their hybrid vigor, which seems to pull them through a freeze in better shape, but by the fact that even quite a bad freeze does not destroy their garden value. There is already so much play of color in the flower, due to the deeper flush on the outside,

that the blanching and browning of frost damage are masked, in so far as color effect at a distance is concerned. This year the "Lamartine hybrids" in the Garden came through several frosts, two snow storms, and one freeze after they were in full bloom and have stayed attractive in the landscape for ten days afterward, though not all of the flowering trusses would have been in perfect condition for home decoration.

In planting "Lamartine hybrids" one should remember that they are bigger and lankier than other varieties. They need plenty of room. If they are not pruned back severely from time to time they shoot up and up, carrying their blooms so high that they are more effective in the distance than close at hand. That is probably where they really belong, at the back end of a garden or the far side of the lawn. With good feeding and a little attention they will throw out great trusses of bloom and make effective splashes of mauve and lilac in the landscape just as the Forsythias and Narcissi are passing out of the picture.

We can nearly always count on them for a fortnight of bloom, and in a cool spring such as that of 1953 we may hope to have them with us for nearly a month.

ORCHIDS LIKE "OAK-BEER"

JOHN NEWTON SCATCHERD

In a recent article on orchids as house plants, I mentioned that feeding appeared to be beneficial to the plants. Further "research" [don't laugh] confirmed the point and brought some rather interesting discoveries. I should like to pass them along for whatever they may be worth and in hopes that they may prove useful to any interested growers.

When I first started feeding my plants, I used a commercial fertilizer (Hyponex) at the rate of one-fourth teaspoon to one-half gallon of water, with the addition of four drops of phosphoric acid. This mixture stimulated rapid growth for a time, but after about a year it was found that the plants apparently had the peculiar faculty of being able to pick out whatever they needed from the fertilizer and shrugging off the rest. From then on, no amount of feeding seemed to make any difference.

Then I came across "Oak-Beer." This simple concoction, made from oak leaves and water, has proved so effective that I have completely changed my feeding program. The resultant increase in both the size and quantity of the roots and in the size and texture of the leaves indicates that this organic fertilizer contains something both necessary and beneficial to the plants. Not being a botanist, I am not prepared to say what it is; but I do know that inorganic fertilizers do not have it. It may be the large amount of tannic

acid contained in the oak leaves, or it may be certain bacteria present in the fermentation process, or maybe a combination of both. Whatever it is, it works.

Since I have a small collection of plants, I do not require any great quantity of the "beer," and I just make it up as I go along. So if the amounts specified in the directions seem a bit odd, please understand that simple expediency governs how much is made at a time. In other words, I happen to have a half-gallon jug, so I make it up in half-gallon lots. A couple of friends of mine make theirs up in old fish-bowls and therefore the amounts are somewhat indeterminate.

The three requirements for making it are:

(1) A large-mouthed container (fish-bowl, coffee-jar, swimming pool, or what have you).
(2) Water.
(3) Enough oak leaves (dry) to turn the water to a dark beer (or cider, if you prefer) color.

To be more precise, I have a large-mouthed glass jar that holds about three pints of water. Into the water I shred eight or ten *dry* oak leaves, pulverizing them in my hands and removing the heavy center stem. Then I stir the mixture a bit to wet all the leaf particles and let it stand for three days, stirring it whenever I think of it. Within two or three hours after mixing, the solution should begin to get quite dark as the minerals leach out of the leaves. If it does not, it is not strong enough and more leaves must be added. At the end of three days the "brew" is ready and I filter it (a funnel and a piece of cotton make an excellent filter) into a one-half gallon jug and add enough water to fill the jug.

The infusion, if you wish to call it that, is given to the plants two or three times a month when in active growth, and they are watered with plain water in between feedings. However, as they approach their blooming period, I stop using the "oak-beer" and do not use it again until the buds are at least an inch up in the sheath. With seedlings, of course, it is used continuously and its effect on them is quite spectacular. Heavy rooting, and thicker, tougher leaves are the almost immediate results. What its long-term effects may be, I cannot say as yet but there has been no evidence of "burning" or any other damage.

So there you have "Oak-Beer"—simple, cheap and effective. It can be made up in any quantity convenient or necessary; it can be made in any strength desired; it is absolutely harmless; and, best of all, it is free. Try it. Your orchids will love it.

ROBERT'S CATERPILLAR CLUB FROM NEW ZEALAND

CARROLL W. DODGE

Recently we received a very interesting fungus (*Cordyceps Robertsii* (Hook.) Berk.) from Te Awamuta, New Zealand, collected by Mr. G. L. Miller and donated by Mr. H. J. Dentzman. It is a member of a large genus, *Cordyceps*, of the family Clavicipitaceae. Most of the species attack insects, filling the body with a hard vegetative mass from which a cylindric or club-shaped stalk, or stroma, emerges and bears the reproductive structures on its upper portion. This is probably the origin of the folk tale that it is a plant-animal, being a caterpillar or worm which turns into a plant. It might be said with more truth that this is a case where the murderer serves as a tombstone for the victim.

The caterpillars of our specimens are members of the moth family Hepialidae, probably *Oenetus virescens* or *Oe. rubrotriidans* (formerly placed in the genus *Hepialus* or *Charagria*), or perhaps of *Porina*. Colenso, who sent some of the early specimens of this fungus from New Zealand to England, thought that his specimens were caterpillars of the *Sphinx* moth which feeds on the roots of the sweet-potato (*Convolvulus Batatas*). The *Oenetus* moth lays its eggs in crevices of the bark of the rata tree (*Metrosideros florida*) or between the bases of the fronds (leaves) of the tree ferns, near the ground. When the eggs hatch, the young caterpillars crawl to the ground and burrow into the moist, porous, peaty soil. Apparently, the caterpillar becomes infected with the fungus before it begins to burrow. Once in the soil, it feeds on the young roots of the rata trees, burrowing horizontally from one root to another. When the caterpillar is full grown it makes a vertical burrow to the surface of the soil, then retires about two to three inches below the surface and becomes a chrysalis in a vertical position with the head uppermost. When the adult emerges from the chrysalis skin, it crawls up through the vertical burrow to the surface of the soil, expands its wings as an adult moth and feeds on the nectar of the crimson rata flowers.

Once a fungus spore has adhered to the skin of the caterpillar[1] it germinates in the moist atmosphere of the burrow, penetrates the thin skin of the caterpillar and slowly digests the interior, gradually replacing the muscles and the internal organs with vegetative filaments. As the fungus develops slowly, usually the caterpillar is full grown and has assumed the vertical

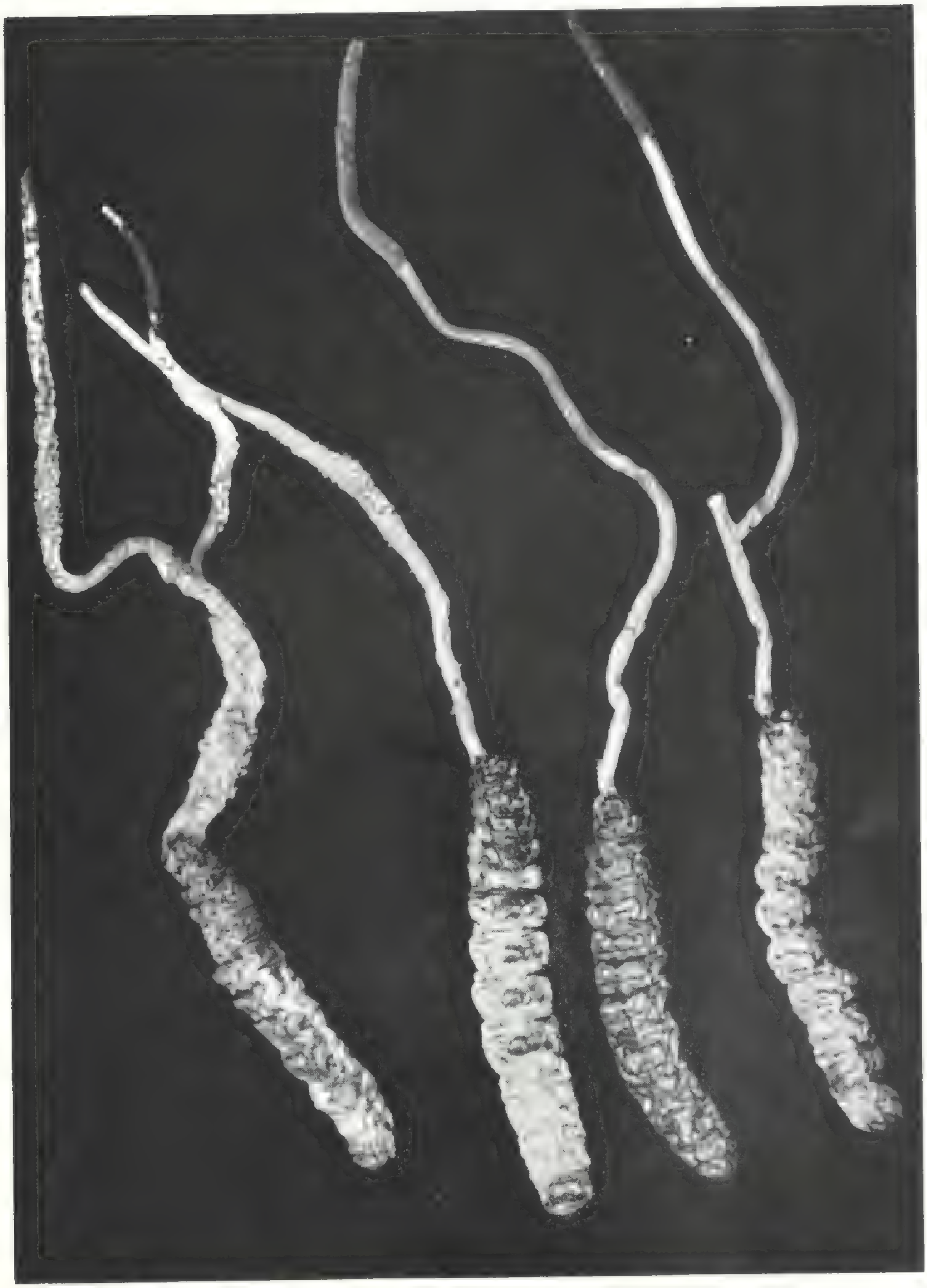
[1] Some authors have suggested that the fungus spores are eaten by the caterpillar and germinate in the intestinal tract, whence it invades the other internal organs, but since the intestines remain intact and are invaded last, this seems very unlikely. By leaving the digestive tract to the last, the caterpillar can continue to feed and thus accumulate much more food for the fungus before the caterpillar finally succumbs. This delay in killing the host as long as possible is always characteristic of an efficient parasite and results from a long series of adaptations.

position in preparation for chrysalis formation before it dies. It the caterpillar dies while still in a horizontal position before it is full grown, the fungus may form a club perpendicular to the body of the caterpillar and push up through the soil, but as it has been able to store less food materials, the club is correspondingly shorter. It is not clear whether the firm and brittle transformed caterpillar body serves only as a food reserve for the formation of the fructification, or whether it also serves to carry the fungus over a resting period in dry weather. In either case, the fructifications are formed after prolonged rainy weather.

The fructification which is to bear the reproductive structures emerges from betwcen the head and the prethorax segment of the caterpillar as a slender stalk which grows up through the vertical burrow formed for the emergence of the moth. When it reaches the surface of the soil, it begins the formation of small white cushions bearing a covering of slender spermatiophores, twice forked and about 20 μ[2] long, each branch bearing a bacilliform spermatium (non-motile male cell, analogous to a pollen grain) about 6×2 μ at its tip. Between these tiny spermatial cushions may be seen pale buff perithecial initials containing the female organs. These consist of a few long, slender unicellular trichogynes (receptive organs, analogous to the stigma and style of a flower) emerging about 20–30 μ above the surface and connecting with a swollen, somewhat coiled filament (ascogonium, analogous to the ovary) below the outer palisade layer of the perithecial initial. A spermatium adheres to the upper portion of the trichogyne and probably its male nucleus enters the trichogyne and passes down into the coil and pairs with the egg nucleus. Then short filaments grow out of the egg cell and produce asci in the center of the developing perithecium. The asci are cylindric or somewhat curved tubes, about 225×5–6 μ, containing eight filamentous ascospores about 220×1.5 μ, divided into about 100 cells each. These ascospores are shot from the ascus through a hole in the top of the perithecium (ostiole) and land on the soil. Since the ascospores easily break apart into individual cells, we have a large number of infectious particles not much larger than bacteria ready to adhere to the soft young caterpillar as it crawls over the surface of the soil, before it begins to burrow.

Meanwhile as the perithecia are developing on the surface of the tip of the stalk (or stroma), new perithecial initials and spermatial cushions are developing just below them, while the stroma elongates slowly, eventually becoming about 7.5–9 cm. (3.5–3.75 inches) tall above the soil. The

[2] μ (Greek letter mu) is the symbol for micron—a unit of length, the thousandth part of a millimeter.



Robert's Caterpillar Club *(Cordyceps Robertsii)*

perithecia become darker brown and ovoid as they mature and after the spores are shed, they collapse and become wholly black. In the forked specimen shown in the figure on the left, new spermatial cushions and perithecial initials are forming between the old shriveled and blackened peritheca in the upper portion of the stroma. Apparently this may be repeated as long as the reserve food supply lasts in the insect body.

Perhaps the slime (called cuticle by Cooke), formed between the young perithecial initials and spermatial cushions, serves to attract insects and thus secure their aid in carrying the spermatium to the trichogyne as insects carry pollen for the flowering plants and thus secure fertilization; or perhaps it may attract the hungry young caterpillar to take a nibble and thus bring the body into a position where the perithecia may discharge the ascospores directly against the body of the caterpillar to secure infection. We need more field observations to settle this point.

This type of development with spermatial cushions on the same stroma between the perithecial initials is very unusual in *Cordyceps* having been previously reported only in the very small *C. Volkiana*, on lamellicorn larvae in Brasil, which has a very short thick stalk and ellipsoidal spermatia $5 \times 2\ \mu$. Perhaps when they have been studied more carefully this type of development will be found in the closely related species on caterpillars from Australia, Tasmania, and New Zealand, such as *C. Gunnii* and *C. Taylori* and also the Tibetan and Chinese *C. sinensis*. In most species of *Cordyceps*, true conidia (asexual reproductive spores) are borne on separate stalks emerging from the insect body before the perithecial stroma emerges (*Isaria* stage) and the details of fertilization are quite different.

Economic uses.—The Maoris of New Zealand used this fungus for food under the names *Hotete, Aweto, Weri*, or *Anube*. It is said to have a pleasant nutty flavor as does the distantly related *Hypomyces lactiflorum* of New England which parasitizes mushrooms, transforming them into a much more delicious food. When charred it was rubbed into the wound in the process of Maori tatooing. The related *Cordyceps sinensis* from eastern Tibet and Szechuan has been used in Chinese medicine in the same way as ginseng. It is so rare, however, that in the days of the Empire it was used only by the imperial household. Most of the species of *Cordyceps* are too small and rare to be used for either purpose. Though closely related to *Claviceps*, a castrating parasite of grasses and cereals, *Cordyceps* apparently does not produce poisonous substances such as the ergot of rye which formerly caused epidemics of a disease known as St. Anthony's fire in Central Europe. These substances are still used as drugs by obstetricians and gynecologists.

Book Reviews:—

A Natural History of Western Trees. By Donald Culross Peattie. Illustrated by Paul Landacre. 755 pp. Houghton Mifflin Co., Boston, 1953. $6.00.

This is a companion volume to the author's previous book on western trees and a good stout companion it is. There are over 750 pages with 35 full-page illustrations. Smaller cuts showing technical details are sprinkled liberally through the book. Like its companion, it is a skillful blending of the technical and the general. There are condensed, scientific descriptions of each species, and at the end there are keys, indices, and a glossary. The bulk of the text, however, is written in an almost racy style and is a blend of what any intelligent person might feel on seeing these interesting trees, together with a skillful distillation of pertinent information from histories, books of travel, and the like. It covers a vast region, all of North America north of the Mexican Boundary and west of the 100th meridian, and the author has been generous in including various desert shrubs and giant cacti which a less inclusive volume might easily have omitted.

The book, however, is much more than just an expert compilation of technical fact and appropriate anecdote. Donald Peattie was trained as a botanist; he has made himself into a successful author. Back of all this he is a perceptive person with a keen interest in plants, in landscapes, and in his fellow human beings. He has travelled long and widely in the West, he has turned what he knows about these trees over and over in his mind. The book is full of original observation and shrewd comment. It tells the kinds of things which a more integrated civilization than ours would want to have included in its technical manuals. The chapter on the Mesquite brings together for the first time some notion of the astonishing way in which this potentially useful tree has been somewhat corrupted through its long association with man into an alarming woody weed which is having to be expertly dealt with in various corners of the world. The California Buckeye is not only accurately described; the phenomenal variation of its inflorescences from one bush to another is commented on and there are homely references to the attitude of many Californians toward a beautiful tree which sheds its seed-pods and drying leaves in such un-Puritanical profusion.

The illustrations are appropriate for the text. The full-page ones give telling indications of what these trees actually seem like in the landscapes to which they are native. The only ones which do not quite come off are those of eastern species which the artist has evidently not seen in the field, or at least not seen often enough. Of these, the one on the Bur Oak might better have been left out; it is wholly out of character.—E.A.

Natural Communities. By Lee R. Dice. 559 pp. University of Michigan Press, Ann Arbor, 1952. $5.50.

This authoritative volume is so clearly written that it will interest a much wider public than the technical group for which it was primarily intended. The amateur naturalist with enough drive to read a monograph which he does not wholly understand, the intellectually keen sportsman, the serious conservationist, would all gain from prolonged exposure to this book. To such people it will bring an orderly framework on which to organize their field observations and much of their general understanding of nature. The technical specialist likewise will find it particularly useful for an over-all orientation to the entire subject: what communities of plants and animals are, how to study them, how to analyze their growth and decline, how to think about them. It is so wide in scope that in spite of its 559 pages some aspects of the subject receive pretty short notice. The complicated question of soil profiles, for instance, is dealt with in less than a page. There are 52 diagrams, mostly original, many of them simple graphs. There is a subject index, but scholars may at times be frustrated by the complete absence of any author index or substitute for it. Not even Darwin makes the Index though represented in the bibliography.—E.A.

The Cacti of Arizona. By Lyman Benson. 134 pp. University of Arizona Press, Tucson, 1950. $4.00.

This beautiful little book of 134 pages is the second edition of the paper-covered bulletin one used to get from the University of Arizona for the incredible price of one dollar. In the process of having its face lifted the price has been quadrupled. Though this will be an unpleasant shock to some, it is not at all out of line with present-day publishing costs. The new format is superior in style. There is an attractive stiff cover, a tasteful dust jacket, and much nicer type throughout than in the old bulletin. The tabular matter has been extended and rearranged. One of the greatest improvements has been to increase the clear line drawings which demonstrate various technical details of cactus flowers and cactus plants. The bulk of the changes in the text are highly technical and relate to Dr. Benson's continuing interest in the classification of southwestern cacti. Many of the names have been changed and some of the species of the first edition are now reduced to varietal status. The most unfortunate feature of the new edition is that there is no easy way in which the ordinary botanist (let alone a rank amateur) can find the relation between the old set of names and the new. There is no index but there are a table of contents and lists of illustrations (29 plates, several of them colored) and 33 text-figures, each one an attractive grouping of line drawings or outline maps.

Though the bulk of the book is composed of the dry bones of scholarship, these bones have been brought together with professional competence and are logically assembled into an articulated whole. For the ordinary biologist the most valuable features of the book are the clear illustrations, the distribution maps, and the concise notes about use, distribution, and the like.—E.A.

A Revision of the North American Species of Lathyrus. By C. Leo Hitchcock. University of Washington Publications in Biology. Vol. 15, pp. 1–104. November, 1952. $2.50.

This technical monograph is published as a nicely-put-together volume with stiff paper covers. For the American relatives of the sweet-pea it presents in compact and orderly fashion a description of the thirty-nine species growing wild in North America, as well as numerous sub-species and several varieties. There are 9 plates with 41 sets of line drawings, illustrating virtually all the species; 10 maps showing their distribution; and 2 charts demonstrating the relationships of the species and the results obtained from various attempts to hybridize them experimentally with each other. Experimental work with these beautiful little plants is said to be well under way, and there are brief summaries of chromosome numbers and hybridization experiments.

The maps have not been prepared with the care of the rest of the publication; in studying the distribution of the Middle Western species one is not always sure whether the species in question occurs in Missouri or whether the little dots merely indicate the positions of St. Louis and Kansas City. Missourians who are proud of their state's interesting flora will be distressed to see that the presence in Missouri of four of these species was not indicated in the material studied by Dr. Hitchcock. These are minor matters. Basic information about the kinds of Lathyrus has been brought together efficiently in a form which will make it generally useful to other scholars. Even the intelligent amateur will be able, through the clear line drawings, the discussions, and the maps, to enlarge his understanding of these charming little plants.—E.A.

Those who sowed grass seed last fall and took good care of it until the rains finally came were in luck. The mild winter let it grow almost unchecked by severe cold. The cool rainy spring has been just what lawn grass would like to have every year. Never have new plantings of grass looked as promising as they do this May.

NOTES

The annual flower sermon, provided for in the will of Henry Shaw, was preached at Christ Church Cathedral, on Sunday, April 26, by Dr. William G. Pollard, Executive Director of the Unit of Nuclear Studies, Oak Ridge, Tenn.

Mr. Paul H. Allen, Plant Collector to the Garden, who for the last several years has been in charge of the Esquinas Experiment Station, Palmar Sur, Costa Rica, has accepted a position as Director of the Fairchild Tropical Garden, Coconut Grove, Florida.

The Garden Club of St. Louis has recently sent a check to the Garden library to be used in rebinding some rare old book in memory of Mrs. Edward J. Walsh, one of the charter members. This is the third such contribution from the St. Louis Garden Club, the other two being in memory of Dr. Hermann von Schrenk and Mr. Peter Seltzer.

Several communities in St. Louis and Franklin counties cooperated in an Easter Sunrise Service at the Arboretum, the morning of April 5. It was an inter-denominational, inter-racial religious service with various churches cooperating. The staff of the Arboretum prepared a large wooden cross for the event which was held on the hill-top parking lot adjacent to the Trail House. Though Easter Day was mostly raw and miserable, it opened with a spectacular sunrise, and the simple service, with meadows of blooming narcissi in the background, was most impressive and was very well attended.

Recent visitors to the Garden library and herbarium include the following: Dr. Gerald B. Ownbey, of University of Minnesota, Minneapolis; Dr. K. H. Reichinger, of the Naturhistorisches Museum, Vienna, Austria; Dr. Christian Bay, Librarian *Emeritus* of John Crerar Library, Chicago; Dr. Mildred Mathias, of University of California, Los Angeles; Dr. Reid Moran, of Stanford University, Calif.; Dr. C. R. Weaver and Dr. E. T. Hibbs, of Ohio Agricultural Experiment Station, Wooster, Ohio; Mr. and Mrs. Richard Froeschner, of Iowa State College, Ames; Mr. H. R. Kemmerer, of University of Illinois, Urbana; Dr. J. D. Dwyer, of Siena College, Albany, N. Y.; Dr. John J. Finan, of the Institute of American Affairs, Department of State, Washington, D. C.; Dr. Alicia Lourteig, of the Instituto Darwinion, San Isidro, Argentina; Dr. Charles B. Heiser and Dr. Charles W. Hagen, of Indiana University, Bloomington, accompanied by a group of nine botany students from that university; Mr. Paul H. Allen, of Fairchild Tropical Garden, Coconut Grove, Florida; Dr. G. A. L. Mehlquist, of University of Connecticut, Storrs; Dr. R. Ruggles Gates, of the Museum of Anthropology, Harvard University; Dr. A. C. Joshii, of the Punjab School for Teachers, Punjab, India.

THE MISSOURI BOTANICAL GARDEN

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SOME FACTS ABOUT THE GARDEN

The Missouri Botanical Garden was opened to the public by Mr. Henry Shaw about 1860. From that date until his death in 1889 it was maintained under his personal direction. Although popularly known as "Shaw's Garden" the name Missouri Botanical Garden was chosen by Mr. Shaw and he definitely indicated that he wished it called by that name. The Garden passed at his death into the hands of a Board of Trustees, designated in Mr. Shaw's will, and the Board so constituted, exclusive of certain ex-officio members, is self-perpetuating. By a further provision of the will the immediate direction of the Garden is vested in a Director, appointed by the Board. The Garden receives no support from city or state but is maintained almost exclusively from the estate left by Henry Shaw. Since 1939 many Garden Clubs and interested individuals have contributed to a "Friends of the Garden Fund" which is used in developing the new Arboretum, located at Gray Summit, Mo. The Arboretum (1) serves as a source of plants, trees and shrubs for the city Garden; (2) affords areas for gradually establishing a pinetum, a wild-flower reservation and various other features on a scale not possible in the city; (3) provides greenhouses for some 50,000 orchid plants.

The city Garden comprises 75 acres, where about 12,000 species of plants are grown, both out of doors and under glass. It is open every day in the year except New Year's Day and Christmas; week days, 8:00 a. m. until 7:00 p. m.; Sundays, 10:00 a. m. until 7:00 p. m. The greenhouses are closed every day at 5:00 p. m.

The main entrance to the Garden is at Tower Grove and Flora Place, on the Sarah bus line (No. 42). The Southampton buses (No. 80), direct from downtown, pass within three blocks of the main entrance.

MISSOURI BOTANICAL GARDEN BULLETIN

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Missouri Botanical Garden Bulletin

Vol. XLI JUNE, 1953 No. 6

BALKAN IVY

EDGAR ANDERSON

Of all the new plants introduced into cultivation by the Garden none has made more of a place for itself in the Garden's own economy than the two strains of ivy from the Balkans, "MBG Bulgaria" and "MBG Rumania." They were brought to this country in 1934 and were formally introduced and named in the BULLETIN for March, 1945. In addition to the hardiness and vigor which are making them generally more acceptable in the Middle West than any other ivy, they have three features which have made them outstanding in the Garden itself. They bring green into the winter landscape; they seem in keeping with our old stone walls and iron fences; they reduce maintenance expense.

Hardiness, which is their most outstanding characteristic, is unfortunately something which only time can test. They look very similar to most other ivies. It takes a hard winter to demonstrate the stuff they are made of. Though they were not named and formally introduced until they had undergone extensive trial there is nothing in their appearance to indicate remarkable hardiness. Since there were already in the St. Louis area a number of other ivies which are reasonably hardy, public demand for the two new varieties was very slight after their introduction in 1934. It was not until many old vines of these other varieties were either killed to the ground (or at least badly damaged) in the winter of 1951-52 that the gardening public began to take an active interest. The new ivy came through that test, as they have all others, with flying colors and we can now unhesitatingly recommend them as ironclad for the difficult St. Louis climate.

So hardy is "MBG Bulgaria" that the oldest plantings of this variety have now assumed mature form, and St. Louisans can now see for the first time what a fully mature ivy plant really looks like. Few plants are so dramatic in their changes from youth to maturity. Young vines of ivy do not branch; they root readily; their leaves are broad; and they do not flower. Left to themselves they climb up trees or walls, and when they reach a height of about ten or twenty feet above ground they begin to put out fruiting

Fig. 1. The oldest vine of "MBG Bulgaria" in the Garden as it appeared in the winter of 1952-53. Mr. Shaw's old country home, Tower Grove (usually now called the "Old Residence"), is in the background. Visitors sometimes ask if these ivy vines harm the trees on which they are growing. There is apparently no injury if the tree is large enough for such a heavy load. In England one frequently sees old oaks and elms which have been hung with ivy for a century or more. One of the charming and characteristic features of the English winter landscape is the shining green leaves of the ivy high overhead in the trees which line hedgerows and roadsides.

Fig. 2. "MBG Rumania" planted around a tool house at the back of a city lot where the shade, the poor soil, and city conditions had previously made it almost impossible to grow any attractive ground cover.

branches which are strikingly different in character. Few of the other kinds of ivy ever survive to this point in the St. Louis area. Although an occasional vine in a very sheltered spot has flowered and even produced fruit, none that we know of have developed the big vigorous fruiting branches which are so characteristic of ivy in the places where it is native. It is hard to believe that one of these branches came from the same plant as the juvenile form with which we are all familiar. It looks different enough to have come from another kind of plant altogether. The fruiting branches are stiff and woody, and they branch out vigorously at right angles to the tree on which the ivy is growing. They are very difficult to root. The mature form branches and rebranches, making a great vigorous bushy growth; the leaves are narrow; and every autumn this whole portion of the plant is covered with small greenish flowers in tight little clusters.

The accompanying illustration (fig. 1) shows the vigorous fruiting branches which have now developed on the plantings made in the Garden in 1936-37. They increase winter color in that part of the Garden and are particularly attractive when there is sleet or snow to contrast with the dark

Fig. 3. The best ground cover for a shady area in St. Louis, the Balkan Ivy, introduced by the Garden under the name of "MBG Bulgaria." Note the large leaves, all of an even height and close to horizontal so that they form a smooth green carpet. As shown in the background, the ivy is climbing up the trees; in another five or ten years it will branch out into its mature form.

green leaves of the ivy. They are a little too rampant and informal for all types of gardens but for us they fit in pleasingly with Mr. Shaw's old buildings and iron fences. The grounds adjoining the Old Residence and the Mausoleum are now as attractive in winter as in summer; vigorous ivy branches spread out here and there overhead. In the Mausoleum grounds the ivy has proved a perfect companion for our snowdrop collection which is now multiplying at a great rate. In late winter and early spring snowdrops by the thousands make a mass display against the dark foil of the ivy and extend our outside blooming season into February and March.

Of the two ivies introduced by the Garden, "MBG Rumania" is the more tolerant of sun and of hot dry places. In other situations "MBG Bulgaria" is to be preferred. Compared with ordinary English Ivy, it has slightly larger leaves and in a well-established planting it exhibits a pleasing regularity. All the leaves are held at about the same height and in the same horizontal position, giving the effect of a smooth even green carpet. One of its chief garden merits is the rapidity with which it puts out its new crop of leaves in the late spring. It was bred for a violent climate, much like our own. The new leaves come out amazingly fast and virtually all at once. One week there is no sign of them; a week later they are popping out all over the place; ten days later and the fresh crop of leafage has covered the whole plot, the old ones just barely showing through.

"MBG Bulgaria" is also outstanding in the ease with which it can be grown from cuttings. In a test made at the Garden some years ago, the yield of rooted cuttings per foot of vine was markedly higher with it than with any other of the dozen or so strains which were tested. Cuttings can be taken at any time but early spring and early fall are the best. If one has a cold-frame or cool greenhouse the simplest way is just to peg down long branches of the ivy in the early fall, covering them well above the level of the stems with sand or vermiculite and then cutting them apart and potting them up as separate plants late in the winter. By springtime one will have pots of vigorous little plants all ready to set out.

For those without greenhouse facilities of any sort, the simplest thing to do is to bring short ivy branches into the house in late winter and put them in jars of water on the window-sill. They will send out roots in the water and can be set outdoors in early spring. Another easy way to start them is to prepare the place they are going and in early spring to peg down long whips of ivy firmly to the ground, using strong wire hair-pins to keep them held tightly against the earth. These horizontal branches are then covered with soil and any light mulching material until all the branches are covered up and even some of the leaves. If the bed is then kept well watered, the ivies will be well enough established so that they will come through a sum-

Fig. 4. View down the valley from the Rila Monastery, Bulgaria. "MBG Bulgaria" was collected in the beech woods beyond the building.

mer drought (or what is worse a drought which coincides with the owner's vacation) without any further attention.

There is only one warning. THESE IVIES SHOULD NOT BE SENT TO GARDENS IN THE SOUTH. They came from a climate about like that of Little Rock, Arkansas. Were they to be grown in northern Mississippi or central Arkansas they would be even more at home there than they are here. Their purple-green berries are relished by birds and they would soon be sown from one end of the South to another and would wind up by being as much of a pest as is the Japanese Honeysuckle.

MEET WILLIAM WITHERING

ALICE F. TRYON

The discoveries of science using the cyclotron, microscope, fluoroscope and like instruments are most impressive and newsworthy. However, the observations and achievements without benefit of elaborate tools have been none the less great. The contributions of scientists as Jean Henri Fabre, Gregor Mendel and Charles Darwin have been through keen observation, careful record and correlated thought. William Withering, eighteenth-century English physician, belongs to this group for his observations and case records on the use of Digitalis—the powerful drug so vital to the treatment of heart and kidney diseases.

William Withering was born at Wellington, in Shropshire, England, in 1741. His father an apothecary, his uncle a physician, and the Reverend Henry Wood supplied his early training until he was prepared to enter the University of Edinburgh in 1762. Four years later he presented a thesis on "De Angina Gangrenosa" and he received his M.D. Withering was very popular in his first practice at Stafford but it was unprofitable and he left to take over an established office in Birmingham, although he continued a weekly visit to the Stafford Infirmary. The Lunar Society, which met in Birmingham monthly on the full of the moon, was attended by Withering and other eminent scientists as Priestley the chemist and Watt the inventor of the steam engine. The exchange of ideas at these meetings must have been a powerful stimulus for these men and it was here that Withering presented his paper, "On the death and burial of Phlogiston," a subject which Priestley explored at great length. His acquaintances and journeys extended from Birmingham to London and the Continent but he was devoted to England. Even when pleurisy and pulmonary ailments forced him to winter in Lisbon he was discontented until he returned to Edgbaston, suburb of Birmingham, where he busied himself with a revision of his flora which he completed a few years before his death in 1799.

Withering is reputed to have had the best practice outside of London and yet he devoted time each day to advise charity cases which totalled between two and three thousand patients each year. In addition to this active medical career he found time for work in other sciences which is scarcely of less merit than his medical accomplishments. His botanical publication bears the long title, "A botanical arrangement of all the vegetables naturally growing in Britain, with descriptions of the genera and species according to the system of the celebrated Linnaeus." This was issued as a two-volume work in 1776 and was, as the title suggests, a translation from Linnaeus of the genera and species occurring in the British flora. The pop-

Digitalis purpurea vulgaris.
Common purple Foxglove.

Stately spikes of purple, rose-pink and white Foxglove make an attractive back-border planting. The clusters of bell-shaped flowers on 2–4 foot stalks tower above masses of luxuriant, closely arranged leaves. The irregular form of the flowers with 3 of the 5 corolla lobes slightly longer and spotted within the throat gives a clue to its place in the Figwort or Scrophulariaceae family. Foxgloves are easily grown and do best in light, enriched, not-too-dry soil and semi-shade. They are biennials and should be sown early in the spring. Their crowns will remain green all winter and they will flower the second year in late May or June. Some 18 species are native to Europe and Asia although many horticultural varieties have been developed. A handsome colored, folio-sized monograph of Digitalis by the English botanist, John Lindley, shows several striking yellow-flowered species from Asia and a tiny pink form, *D. minor* β from Spain. The origin of the name Foxglove is uncertain but possibly may be a corruption from folk, meaning little folk or fairies' gloves. The Latin name Digitalis from *digitus*, meaning a finger, was applied centuries ago by the German herbalist, Fuchs. Illustration from "Parkinson's Theatrum Botanicum" of 1629.

ularity of the first edition resulted in a second edition of three volumes in 1787 and a third of four volumes in 1796. A copy of the latter work is in the Garden library and supplies us with data on the medicinal use of native plants as well as Withering's own observations on botany, such as the following on the Royal Fern, *Osmunda regalis:*

> Impressions of the leaves are frequent in the nodules of iron stone found in Coalbrook Dale Iron works. It is the only species of an indigenous vegetable which I have ever seen in a fossil state. But it is a native of Virginia also. All the other impressions of Filices, which I have seen on ironstone, seem to be those of American plants. The root boiled in water is very slimy, and is used in the North of Europe to stiffen linen instead of starch.

This flora was continued by Withering's son and others until as late as 1848. Withering was honored by his contemporary, the French botanist L'Héritier, who proposed the genus Witheringia for a group of plants of the Nightshade Family.

His interest in chemistry and mineralogy stemmed from his early college studies and was undoubtedly stimulated by his associations with Priestley. Some of the papers he presented are: "Experiments on the different kinds of marle found in Staffordshire", "Analysis of a hot spring in Portugal" and "Experiments on the Terra Ponderosa." The name Witherite has since been applied to the mineral which is chemically known as $BaCO_2$, native barium carbonate, which he noted as Terra Ponderosa.

Withering's original paper entitled, "An account of the Foxglove, and some medical uses with practical remarks on dropsy, and other diseases," published in 1785, is one of the rare volumes in the Garden library. In this browned and frayed copy written in the quaint style and lettering of the period we find the observations of a scientist which transcends his time. A review of this old account gives us an insight to scientific views and medical practices of the day. Like our antihistamine and Penicillin, Digitalis gained rapid popularity but was at first prescribed and used without caution. There being no regulations or controls on the drug at that time, Withering undertook to write his account in order to caution against its dangers and to present his experiences using it over a period of ten years. This is based on 163 cases of his own and some 50 of his colleagues'—some in sufficient detail to permit modern diagnoses. More than a hundred of these patients responded favorably to Digitalis. Several cases are included where death resulted before the drug was administered and advice pertaining to the interpretation of these is given particular note. Some of the cases might be construed as revealing a primitive state of eighteenth century medical practices but they are hardly a fair basis on which to judge for, as Withering states, physicians were seldom consulted in cases of chronic diseases until all the usual remedies failed and those who were saved were snatched from destruction.

These are records for the most part of cases in which Digitalis was used in treatment of Dropsy although as case 121 clearly indicates, Withering was aware of its action on the heart.

> August 25th. T_____ W_____, Esq; AEt, 50. A free liver, diseased visera, belly very tense, and much swollen; fluctuation perceptible, but the swelling circumscribed; pulse 132. This gentleman was under the care of my very worthy friend Dr. Ash, who, having tried various modes of cure to no purpose, asked me if I thought the Digitalis would answer in this case. I replied that it would not, for I had never seen it effectual where the swelling appeared very tense and circumscribéd. It was tried however, but did not lessen the swelling. I mention this case, to introduce the above remark, and also to point out the great effect the Digitalis has upon the action of the heart; for the pulse came down to 96. He was afterward tapped, and continued, for some time under our joint attendance, but the pulse never became quicker, nor did the swelling return.

From these cases we can compile a considerable list of herbs which Withering used in addition to Digitalis—dandelion, seneka, squills, jallapa, gentian, garlic, rhubarb, burdock, opium, myrrh, aloe, ginger and parsley. Case 12 illustrates the common practice wherein three or four preparations were prescribed and if these did not improve the condition several more were tried and if there was still no response Digitalis was used as the last resort.

> September 12th. Miss C_____ of T_____, AEt. 48. An ovarium dropsy, and anasarcous legs and thighs. For three months in the beginning of this year she had been under the care of Dr. Darwin, who at different times had given her blue vitriol, elaterium, and calomel; decoction of pareira brava, and guiacum wood, with tincture of cantharides; oxymel of squills, decoction of parsley roots, &c. Finding no relief, she discontinued the use of medicines, until the urgency of her symptoms induced her to ask my advice about the end of August. She was greatly emaciated, and had almost a total loss of appetite. I first tried small doses of Merc. sublim. corr. in solution, with decoction of burdock roots, and blisters to the thighs. No advantage attending the use of this plan, I directed a decoction of Fol. Digit. a dram and a half to a pint; one ounce to be taken twice a day. It presently reduced the anasarcous swellings, but made no alteration in the distension of the abdomen.

Withering's remarks in opposition to the notion that the external configuration of plants indicate the diseases they are adapted to cure leads one to suspect that the old Doctrine of Signatures was not completely out of vogue. This fifteenth-century belief that plants in their form, scent or color depict the diseases they will cure viz.—the spotted, lung-shaped leaves of the Lungwort, Pulmonaria, indicate that it will cure diseases of the lungs —came into popularity in England along with alchemy, astrology and like magic.

There was much to be learned about plants during Withering's time. This was a period of great botanical activity. The system of plant classification that Linnaeus presented in 1753 was beginning to penetrate and doctors were exploring the simples which were in general household use. How could the virtues of these plants be detected? Withering makes three suggestions in answer to this problem. The first, and one which he states received little attention, is by observing their effects upon insects and

quadrupeds. One of the methods of determining the potency of Digitalis at the present time is by testing in such a manner. The method described in the United States Pharmacopoeia is a pigeon assay in which dilutions of a tincture of the drug are injected into the bird at five-minute intervals until the heart ceases to beat. This time is then compared with that of the U.S.P. Digitalis reference standard. The test was formerly conducted on frogs. A second method he suggested of evaluating herbs is by analogy or deduction from the already known powers of some of their congeners. However, the doubt cast by Withering's own views that this method can be perfected only as we learn the true natural relationships of plants was certainly appropriate in his day and still is applicable. A branch of botany, taxonomy, is primarily devoted to the search for ways in which natural relationships can be established. The third method Withering suggests is of greatest interest for this he later explains is the way he came upon Digitalis —from the empirical usage and experience of the populace. Withering did not discover the herb himself. He merely recognized a good thing when he saw it. Several references on Digitalis mention the following story as a legend, however, the following is taken from Withering's account:

> In the year 1775, my opinion was asked concerning a family receipt for the cure of the dropsy. I was told that it had long been kept a secret by an old woman in Shropshire, who had sometimes made cures after the more regular practitioners had failed. I was informed also, that the effects produced were violent vomiting and purging; for the diuretic effects seem to have been overlooked. This medicine was composed of twenty or more different herbs; but it was not very difficult for one conversant in these subjects, to perceive, that the active herb could be no other than the Foxglove.

Readers of George Eliot will recall how Silas Marner, a century later, cured a woman suffering from heart disease and dropsy using Foxglove after the doctor failed. Scientists are keenly aware of the knowledge of native herbalists and today search the wilds of South America and Africa to learn of preparations as Curare and Strophanthus used by peoples we might once have regarded as wholly uninformed.

During the past 150 years much has been learned about Digitalis. Through selection and plant-breeding programs the quality of the drug-producing plants has been improved. Methods of commercial production have been studied in central Europe, India and the United States. Chemical analyses have shown Digitalis to consist of four glucosides—Digitoxin, Digitalin, Digitalein and Digitonin and these have been isolated and purified so that the individual glucoside can be administered. Withering's methods have been improved and refined but the test which he proposed in the introduction of his account, a test which all scientific accomplishments must meet, has surely been satisfied.

> After all, in spite of opinion, prejudice, or error, Time will fix the real value upon this discovery, and determine whether I have imposed upon myself and others, or contributed to the benefit of science and mankind.

Indian Paint-brush on the Arboretum glade

OF INDIAN PAINT-BRUSHES AT THE ARBORETUM

LOUIS G. BRENNER

Most spectacular of recent introductions into the Wildflower Garden is the Indian Paint-brush *(Castilleja coccinea)* which has added brilliant splashes of red-orange to the present colorful glade flora. The plants came into bloom in mid-April, and it is expected that they will flower until the end of May. They have made particularly striking displays where they have mingled with vigorous clumps of Birds-foot Violet. In addition to forming brilliant masses of color, the Indian Paint-brush is an interesting plant in that the flowers themselves are comparatively inconspicuous. The bright display is almost entirely created by leafy-bracts surrounding the true flower which is tubular-shaped and greenish-yellow.

Because the Indian Paint-brush is a habitant of upland prairies and glades its introduction onto a glade in the Wildflower Garden was easily accomplished by broadcasting the tiny seed. It has been found that at least two years are usually required for the plants to come to bloom from seed. It has also been observed that almost invariably the plant will associate itself intimately with a clump of the Glade Black-eyed Susan *(Rudbeckia missouriensis)*, suggesting that the Paint-brush may practice partial parasitism as do other closely related plants such as the False Foxglove (Gerardia), and Wood Betony (Pedicularis).

At present the Indian Paint-brush may be found on either side of Boulder Trail as it crosses the glade, and it is hoped that this introduction may spread through self-seeding to make the whole glade aglow in future years.

The Fringe Tree.—A native American shrub which should receive more attention from plant breeders and gardeners is the Fringe Tree, *Chionanthus virginica.* The Garden has a fine collection of these shrubs, particularly around the eastern end of the North American Tract where they were set out over forty years ago and have had to shift for themselves much of the time. When out of bloom they are a not-ungraceful shrub with simple largish leaves of a dull green. They make a good screen or background but are not particularly exciting. When in bloom during May they are a foamy fountain of white and pale green, covered with delicate blooms over the entire bush. Their fragrance is delightful and they make an effective background for almost any other flowers because of their neutral color.

The Fringe Tree would repay further study. In the Garden's collection there is striking variation from bush to bush. While all of them are attractive, some are much more so than others and one or two are worth putting on the market as named varieties. Some of them have their blossoms in great sprays of bloom roughly as large as a bushel-basket. In one form these are borne at the end of picturesque curving branches. Others have their blossoms in neat little sprays sprinkled here and there over the bush.

When they are in full flower the blooms of the Fringe Tree are very effective for large flower arrangements. They keep well and though they are fragrant the scent is not too heavy for a living-room. The soft greenish white of the blossoms is particularly attractive with pale pink. If, for instance, you have an azalea which comes close to magenta, to make you really proud of it try displaying it against a background of Fringe Tree blossoms. All the coarseness will disappear and it will seem to be a clear rosy pink.

JOINTED GOATGRASS

GEORGE B. VAN SCHAACK

Noted in St. Louis for the first time a year ago, Jointed Goatgrass (*Aegilops cylindrica* Host) again last month bordered the sidewalks along Shaw Boulevard just west of Kingshighway. Covering even larger areas than last year, it is now growing so thickly as to indicate a residence of several years. The plant is a wanderer from the Mediterranean, native at least in the Balkan Peninsula and southern Russia, and widely spread as a weed. Undoubtedly, this colony developed from seed dropped from packing material, probably wine-case packing, for there are two restaurants only a block away and this plant is found in the wine areas of Italy.

The flowering shoots of Jointed Goatgrass are about a foot and a half high, terminated by a rather stiff, hard cylinder, half as thick as a lead pencil. This cylinder is marked at intervals of about half an inch by circular rings; these are the joints at which the inflorescence breaks after the seed is matured. The part between each two adjacent joints contains a tightly compressed group of two to five flowers more or less hidden in a cavity of the stem by a closely appressed leaf-like scale. From each of the upper groups of flowers extend upward two or more awns, long, needle-like bristles one to three inches long. In the illustration, taken from Host's "Gramineae," wherein the plant was first described, the awns appear somewhat shorter than in most of the plants to be found in St. Louis. The right-hand spike in the figure illustrates how the scales covering the flower groups bend outward during the period of pollination.

Unless you are a botanist or someone interested in the unusualness of the commonplace you probably wouldn't have given the plants on Shaw Boulevard a second look, for in a group they present a rather stiff and unbending appearance. But although Jointed Goatgrass lacks the grace of bluegrass or the elegance of the so-called Eulalia it has good family connections; it is first cousin of one of the immediate ancestors of our cultivated wheats. Half of its genetic material is found also in spelt, a native wheat of southeastern Europe; there is much evidence that hybrids of spelt and other primitive wheats gave rise to our modern cereal.

As a name Jointed Goatgrass is about as euphonious as the plant is graceful. Its more euphonious Latin name, Aegilops (pronounced e-ji-lops), is borrowed from the Greek; Theophrastus used it for a kind of wild oat. The Greeks had also a word *aegilos*, "an herb of which goats are fond." It is not clear whether this herb was the same as Aegilops, but probably either confusion of the two or their identity accounts for the common name, Goatgrass.

Aegilops cylindrica Host

Copied from plate 7 of Volume 2 of Host's "Icones et Descriptiones Graminum Austriacorum" published in Vienna in 1802. This four-volume work, devoted to the grasses of the Austrian provinces, is one of the many rare and valuable folios in the Garden library.

NOTES

The Meramec River Basin Resources Committee held a meeting in the assembly room at the main gate of the Arboretum on May 9.

Two of the John Simon Guggenheim fellowships which are granted to "persons of unusual capacity for scholarly research . . ." have been awarded for the ensuing year to former students in the Henry Shaw School of Botany: Dr. Charles B. Heiser, Associate Professor of Botany, Indiana University; and Dr. Gerald B. Ownbey, Associate Professor of Botany, University of Minnesota.

The second number of Volume XL of the ANNALS OF THE MISSOURI BOTANICAL GARDEN has recently been issued with contents as follows: A Contribution to the Lichen Flora of Arizona and New Mexico, by Emanual D. Rudolph; The Analysis of Suspected Hybrids, as illustrated by *Berberis* × *gladwynensis*, by Edgar Anderson; Variation in Cob Morphology among Certain Archaeological and Ethnological Races of Maize, by Norton H. Nickerson; Cytology, Morphology, and Systematic Relationships of *Delphinium* × *Belladonna* Hort. ex Bergm., by Marilyn Amy Gage.

Recent visitors to the Garden library and herbarium include: Prof. J. Lanjouw, of the University of Utrecht, Holland; Mr. Jean T. Delacour, of the Los Angeles County Museum of Science, History and Arts, Los Angeles, Calif.; Miss Ruth Wood, of Springfield High School, Springfield, Ill., accompanied by a group of her students in botany; Dr. Ruth B. Thomas, of James Milliken University, Decatur, Ill.; Mr. George E. McCluer, landscape architect, of Buffalo, N. Y.; Mr. Hsuan Keng, of the department of botany, Taiwan University, Taipeh, Taiwan, Formosa; botany class of Greenville College, Greenville, Ill., conducted by their teacher, Mr. John H. Ayers.

At the commencement of Washington University, June 10, advanced degrees were conferred upon the following students in the Henry Shaw School of Botany: *Master of Arts*—Robert J. Gillespie, Jr., A.B. Washington University (Plant Breeding); Frank Winstead Martin, B.S. Pharmacy, St. Louis College of Pharmacy; William H. von Meyer, A.B. Washington University (Microbiology); Dorothy E. Ober, B.S. Cornell University (Plant Breeding); Glenn E. Pollock, Jr., B.S. Ed., Washington University (Microbiology); Harry R. Skallerup, B.S. University of Illinois (Genetics). *Doctor of Philosophy*—Robert C. Cooper, B.Com., Victoria University College, B.A., Auckland University College, New Zealand (Taxonomy); Marilyn Amy Gage, B.S., Pennsylvania College for Women, A.M., Washington University (Cytogenetics and Plant Breeding); Jorge León, M.N., Escuela Normal de Costa Rica (Taxonomy); Norton H. Nickerson, B.S., University of Massachusetts, M.A., University of Texas (Morphology and Genetics); Sidney D. Rodenberg, A.B. and A.M., Washington University (Physiology).

THE MISSOURI BOTANICAL GARDEN

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SOME FACTS ABOUT THE GARDEN

The Missouri Botanical Garden was opened to the public by Mr. Henry Shaw about 1860. From that date until his death in 1889 it was maintained under his personal direction. Although popularly known as "Shaw's Garden" the name Missouri Botanical Garden was chosen by Mr. Shaw and he definitely indicated that he wished it called by that name. The Garden passed at his death into the hands of a Board of Trustees, designated in Mr. Shaw's will, and the Board so constituted, exclusive of certain ex-officio members, is self-perpetuating. By a further provision of the will the immediate direction of the Garden is vested in a Director, appointed by the Board. The Garden receives no support from city or state but is maintained almost exclusively from the estate left by Henry Shaw. Since 1939 many Garden Clubs and interested individuals have contributed to a "Friends of the Garden Fund" which is used in developing the new Arboretum, located at Gray Summit, Mo. The Arboretum (1) serves as a source of plants, trees and shrubs for the city Garden; (2) affords areas for gradually establishing a pinetum, a wild-flower reservation and various other features on a scale not possible in the city; (3) provides greenhouses for some 50,000 orchid plants.

The city Garden comprises 75 acres, where about 12,000 species of plants are grown, both out of doors and under glass. It is open every day in the year except New Year's Day and Christmas; week days, 8:00 a. m. until 7:00 p. m.; Sundays, 10:00 a. m. until 7:00 p. m. The greenhouses are closed every day at 5:00 p. m.

The main entrance to the Garden is at Tower Grove and Flora Place, on the Sarah bus line (No. 42). The Southampton buses (No. 80), direct from downtown, pass within three blocks of the main entrance.

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Missouri Botanical Garden Bulletin

Vol. XLI SEPTEMBER, 1953 No. 7

INTIMATE JOURNEYS TO CALIFORNIA GARDENS

LADISLAUS CUTAK

Ganna Walska's Lotusland

The writer was one of a small group of guests at a buffet luncheon given by Mme. Ganna Walska at her Montecito estate. Under colorful Tibetan parasols, borscht and piroshky were served, along with turkey, fish, and other delicious food, while Madame Walska dashed from one table to another, seeing that the plates were full and stopping to take part in conversation which almost always touched on plants. The honored guests, you see, all had something to do with plants in some form or another. There were Jean Delacour, director of the Los Angeles County Museum and an old neighbor of Mme. Walska's in France; Hugh Evans and his son, who operate one of the best exotic plant nurseries on the West Coast; Harry Johnson, Sr., cactus authority and owner of an outstanding cactus nursery, with Mrs. Johnson; Ralph Stevens, noted landscape architect and designer of Mme. Walska's garden, with Mrs. Stevens; E. O. Orpet, famed horticulturist, with Mrs. Orpet; Charles Redler, gardener in charge of several Beverly Hills estates, with Mrs. Redler; and at least four other personalities of the garden world.

After the luncheon, the diners walked down to the imposing iron gates which were opened wide to greet the members of the cactus confraternity who were holding their biennial convention in Arcadia. And what a treat awaited the cactus lovers—a fabulous garden, not with a few scattered specimens in beds, but massed displays extending from the gates to the house, or roughly about the length of two city blocks!

Mme. Walska calls her estate "Lotusland," from that sacred lily of the Orient that grows so abundantly in one of the big lakes on the property. Lotus (Nelumbiums), with their stately habit and showy flowers, are truly suitable for large ponds. They are among the few modern flowers which were known and cultivated by the ancients.

Outside the mighty iron gates the plantings consist of robust Opuntias, colorful Mesembryanthemums, and hundreds of silver-gray Echeverias, spelling out "Lotusland." Inside the gates, *Agave attenuata* borders the curve of the driveway that leads to the house. This unarmed Century Plant lends

Mme. Ganna Walska beside some of her most prized cacti.

itself nicely to decorative use, its fleshy and glaucous leaves rising in a large symmetrical rosette at the apex of a short trunk. The plants in the garden are not allowed to produce those large foxtail-like flower-stalks, as they would die after flowering. If the asparagus-like inflorescence begins to emerge from the crown of leaves it is immediately cut out, and as a result a multiple crown is formed.

The Walska garden is a veritable botanical treat. The bizarre cacti are not the only plants on exhibition. There are tree-high Bamboos, huge Bananas, towering Eucalypti, massive Cycads, Tree Ferns, and hundreds of other fascinating exotics to drool over. At one end of the spacious lawn stands a towering Monterrey Cypress whose horizontal branches form a broad, spreading head. It must be a patriarch of the place, fifty or more feet high and erect in stature, unlike the gnarled, dwarfed picturesque specimens found along the California sea-coast.

"Lotusland" is a succession of gardens, each one unique in its own right. It is a vegetable Grand Canyon, with moods as kaleidoscopic as that of the Arizona wonderland. Love, laughter and tragedy hover in the hedge-enclosed, grass-terraced outdoor theater with its elfish statuary; tranquillity reigns in the blue-and-white garden where every plant from grass to shrub and tree must be of pallid hue; jungle silence pervades the lush fern dell where only broken sunlight casts patterns on the lacy fronds of Ferns and Cycads; while the urge to live is expressed so nobly in the fantastic growths of Cacti under full sun.

On the way to the tiled swimming pool one passes through a miniature grove of Pygmy Date Palms, more Tree Ferns, and a bed of various-sized Dragon-blood Trees. Huge Staghorn Ferns, suspended from branches of trees, present a sight never to be forgotten. Around the stone wall which half encircles the pool and shelters the artificial sandy beach are scattered huge white seashells planted with the whitest Cotyledons and Kleinias in existence. These plants also adorn the pockets built into the wall and on top of it.

Across the road beyond the swimming pool are formal gardens of roses, dahlias, geraniums, and other old-fashioned favorites. Robust plants of both the blue and white Agapanthus, better known as "Lily of the Nile," are extensively featured in several beds, along with the handsome evergreen foliage of the Clivias. Agapanthus bloom profusely in the California climate, particularly during the summer. Clivias are attractive all the year round, but more so when their handsome umbels of orange-scarlet flowers make their appearance in spring and early summer. Another African bulbous plant in great evidence on the Walska grounds is Haemanthus or Blood Lily. Like most of the Cape bulbs, it blooms in summer, the great ball-like heads crowning foot-long scapes. It was growing in partial shade under the trees, in the garden of Madame's studio where the writer was quartered during his stay.

Mme. Walska's house is of early Californian style, with red-tiled roof and stuccoed walls, against which are planted tall tree-like Cacti and Spurges. Some of these plants reach the second-story windows and a few extend

Torch Cacti planted against Mme. Walska's house

beyond the roof. Nocturnal blossoms appear on the spiny branches during the summer, often remaining fully open until late in the cool mornings. The house is furnished with many rare and beautiful objects of art. For instance, in a corner of the drawing room is a Playel harpsichord, and many original world-famous oil paintings hang on the wall. In the library are displayed her famed Tibetan collection of tapestries, banners, and gold gods from temples. In the dining-room, attention is directed to the wall arrangements of rare Chantilly and Dresden china, especially the Chantilly against the ceiling.

Madame Walska's mansion is open only on rare occasions, and she lives in an apartment separated from the mansion by a patio. Here she grows rare orchids, basket ferns, and other choice exotics. Against the corner of the house a Bougainvillea was ablaze with orange-pink flowers. A fantastic bird cage dominates the patio, which, if memory serves right, originally belonged to an Austrian monarch. Before Mme. Walska acquired it, the cage was rented for a film in which Bing Crosby starred.

Mme. Walska became interested in Cacti about ten years ago. The Ivy vine which covered the house then was removed and Cacti and other succulents planted against it. Now, when the sun is right, they cast fantastic shadows on the pinkish-cream walls. Most of them are South American Cerei in several varieties, but there are a few African Euphorbias which greatly resemble them in habit of growth. However, many Mexican Tree Cacti are also featured, among them a very good specimen of *Lemaireocereus*

marginatus beside the entrance-way. This is a beautiful and fast-growing plant which sends up branches from the base in organ-pipe fashion and for that reason it is popularly known as "Organo." Two good specimens of the thick, many-fluted *Pilocereus polylophus* from Mexico were loaded with buds about ready to unfurl their dark red petals. This species is rather striking because of a thick erect stem of about fifty sharp-angled ribs punctuated by closely set areoles with yellowish hair-like spines. The most noted recent acquisition is a very tall Old Man Cactus, *Cephalocereus senilis*, probably the tallest "Old Man" in cultivation in the United States. Of this, Madame is very proud.

Underneath the tall cacti are hundreds of Golden Balls, *Echinocactus Grusonii*, in various sizes and shapes. While the majority are single-headed, a number produce multiple plantlets from the base. All of them possess spines which glisten like gold when back-lighted. The Golden Ball is native to Central Mexico and grows in places not easily accessible. It required a two-day journey on mule-back for the writer to reach the *barranca* where these plants grow in abundance, but the sight of the golden "Behemoths" was well worth the inconvenience. The largest and oldest specimens attain a height of five feet and a girth nearly as great.

On the other side of the doorway several odd, cabbage-shaped Agaves vie with the Golden Balls for attention. These do not attain the monstrous proportions of the pulque-producing Magueys, but are perhaps more decorative and useful because of their small size. Some of the Magueys have thick heavy leaves up to ten feet long spreading from a central core, in time producing flower stalks as high as a medium-sized tree.

Across the driveway from the house is a bed of blue Agave that must run well into several thousand plants. In the same area are thousands of arborescent Aloes growing under the shade of Palms and other trees. Mme. Walska is not satisfied with only a few specimens; she demands spectacular mass displays. This may be a reflection from the years when she was a celebrated diva and used to lavish settings on the stage.

In one bed near the house are massed at least a hundred of the tall *Kalanchoe beharensis*, their trunks marked by the odd broad scars left after the leaves have fallen. This particular Madagascan succulent assumes tree size and without a doubt is the tallest member of the Crassulaceae family which includes the popular Hen-and-Chick plants and the Sedums, well-known rock-garden favorites. There are two phases of this Kalanchoe; in one the leaves are of silver-green plush and in the other cocoa-brown.

Another bed contains great numbers of *Dracaena Draco*, but it is dominated by the largest Dragon-blood Tree the writer has ever seen. This Canary Island endemic is famous in legend of the Islands. The trunk of one

tree on Teneriffe was so enormous that a chapel was built within its hollow body and used by natives as well as Christians. A terrific windstorm destroyed it about a century ago. The popular name was given because of the blood-colored resinous substance which at certain times exudes from the cracks in the trunk.

Just beyond Mme. Walska's living quarters is a bed containing a number of interesting grafted crests—fasciated abnormal growths very much prized by cactus connoisseurs. Ordinarily, this type of growth is hard to keep on its own root, so it is usually grafted upon a fast-growing stock such as Cereus and Trichocereus.

Across the road from the bed of crests is an area devoted to Euphorbias or Spurges. They all possess milky latex which can be very irritating to the skin. In the African deserts Euphorbias are often mistaken for Cacti. Cactiform types are very diverse and fascinating; some species form compact globose heads or mounds, others bush-like growths, and still others shapely trees with candelabriform habit. The individual flowers are inconspicuous but when massed along the ribs present a startling sight. The Medusa-head Spurge is prominently featured in this part of the garden.

The Saguaro *(Carnegiea gigantea)*, stately sentinel of the Arizona landscape, is represented by a number of specimens averaging about ten feet in height. It is a large columnar cactus of slow growth and the age of the Walska specimens may be conservatively estimated at about fifty years. During the writer's visit they were producing blossoms at the uppermost areoles. The flowers are broadly funnel-shaped and expand their whitish petals in a wide-spreading ring from which the abundant short stamens protrude as well as the thickened style.

It would be impossible to describe all the varieties of Torch Cacti that are represented in Walska's garden. A few outstanding examples are those belonging to the genera Lemaireocereus, Pachycereus, Escontria, Trichocereus and Cereus. *Lemaireocereus stellatus* was producing small narrowly campanulate red blossoms in a circle at the top of the stems. Another rare cactus was *Morawetzia Doelzianus* whose equally small rose-red flowers appeared from a terminal pseudocephalium characterized by definite tufts of white hair at the stem tips. Several beautiful specimens of the white-spined *Cleistocactus hyalacanthus* were seen in one of the beds, together with other handsome hairy cacti such as Oreocereus and Espostoa. The Mexican *Cephalocereus senilis* occupied a bed of their own. Probably the best known of the white-whiskered cacti, it has been a favorite of all *bona fide* cactophyles. Even the tiniest of plants exhibit wisps of white hair.

Perhaps the other succulents are not as bizarre as the true Cacti but they are equally attractive and often lend color to the small rockery. They belong

to a diverse group of plant families—the Amaryllidaceae, Aizoaceae, Asclepiadaceae, Crassulaceae, Liliaceae, and some fifteen others. Nature has provided these plants with water-storage organs to tide them over the long dry seasons of their desert homes. In Ganna Walska's garden there is a representative group of succulents including such genera as Aeonium, Dudleya, Echeveria, Kalanchoe, Kleinia, Aloe, Gasteria, Mesembryanthemum, and many others. From their healthy appearance they must be happy in their surroundings.

The living Telegraph Pole, *Idria columnaris*, is not really a succulent in the strict sense of the word, but a xerophyte that fits in nicely with cacti and succulents. It branches in a peculiar fashion, and individual plants give the impression of being planted upside down.

One could go on raving about the wealth of plants grown at "Lotusland" but there must be an end sometime in order to let the reader in on other gardens visited on this trip. Mme. Ganna Walska is to be commended on keeping up such a fine show place which outshines many a botanical garden. It is our fervent wish that such a magnificent collection will be kept up for posterity.

Huntington Botanical Garden

Every visitor to California should include the Huntington Botanical Garden on his *must* list. This famous institution is part of the San Marino Ranch which the late Henry E. Huntington purchased in 1903. At that time the estate included some six hundred acres of rolling land. With the intention of settling permanently on the ranch he arranged to landscape a part of the grounds where a residence was to be built. By 1907 he had improved the ranch considerably but there was a section of hillside which needed attention, so he asked his superintendent, William Hertrich, for suggestions. Hertrich boldly suggested an outdoor Cactus and Succulent garden and backed it by stating that since the soil was poor and gravelly it was not good for anything else. Even though Cacti did not particularly interest Mr. Huntington, he agreed to give the desert plants a trial on a half-acre site.

At the start only the more common and native varieties of Cacti were planted but later bizarre ones were added. As the collection thrived, Huntington began to see real possibilities in a cactus garden, so he induced Mr. Hertrich to undertake a few field trips for more plants. The first one (1908) was through the Southwest from where carloads of plants were dug up, crated, and shipped to San Marino. In 1912, an extended trip into Mexico netted two additional carloads of cacti. As the collection grew the garden was enlarged to include five acres. By 1925, ten acres were alloted to the

Century Plants, Easter Lily Cactus, and Torch Cactus in the Huntington Botanical Garden.

desert plants, and little by little the area has been increased until at present it spreads out over fifteen acres.

Henry Huntington amassed a fortune in real-estate and railroading. Being interested in horticulture, art objects, rare books, manuscripts and sculpture, he began acquiring these on a large scale. The paintings and sculpture were kept in his spacious Georgian house which is now known as the Art Gallery; the priceless books were stored in a separate building, a French Renaissance adaptation. The Art Gallery contains an unusually fine collection of 18th-century English portraits but probably the most famous and popular painting is Gainsborough's "The Blue Boy." The Library contains approximately 200,000 books (a number being 15th to 17th century editions) and manuscripts.

The present Huntington estate consists of more than two hundred acres, only part of it being open to the public. The writer had the opportunity to go over the whole estate and even visited the circular white marble mausoleum where Huntington and his wife are buried. There is no admission fee charged, but admission cards must be secured in advance by written application. The grounds are beautifully laid out and boast several individualistic gardens, the most noted and perhaps the most picturesque being the Desert Garden which represents nearly fifty years of collecting.

After handing your card to an attendant you ordinarily follow the trail leading to the Cactus Garden. Along the roadway and on the spacious lawn are grown many palms ideally adapted to the climate of southern California. Bordering the curved road one will notice many Crassulaceous plants forming mats on the ground, interspersed with Aizoaceous Ice Plants, Tiger Jaws, Tongue Plants and shrubby Mesembryanthemums. Euphorbias and Aloes are in the background. A little farther on, the visitor will receive his first breath-taking view—a portent of what is to be seen with each succeeding step. On the right, to the west of the center walk, as far as the eye can see, mounds of beautiful Pincushion Cacti (Mammillaria) nestle between rocks and boulders. Some of these clusters are actually three feet across and consist of more than a hundred heads. Outstanding are many clumps of *Mammillaria compressa*, each head with the characteristic crown of white wool. This species is very abundant in the hills of Central Mexico, especially in the neighborhood of Ixmiquilpan, where the writer did some collecting in 1947. Sometimes huge clusters grow out of nearly perpendicular rock and one wonders how they can find a foothold there. Equally attractive are *Mammillaria geminispina*, *M. magnimamma* and a few white-spined forms like *M. Parkinsonii*. The Pincushion Cacti are popular the world over because there are so many varieties and because individual plants take up so little room. It is surprising how many potted specimens can fit in the average window. Mammillarias are globose to short-cylindric plants with either milky or watery sap. Tubercles or nipples protrude from the plant body in more or less spiraled rows, each of them surmounted by an areole exhibiting in many species a diadem of spines. The comparatively small campanulate blossoms often form a colorful wreath at the crown, these maturing into scarlet or crimson fruits some looking like tiny radishes, others like chili-peppers.

Immediately behind the Mammillarias are various groups of Cerei, some branching from near the base and forming shrubby growths, others contented with simple stems. One member, *Trichocereus thelegonus*, from Argentina, has procumbent stems which creep along the ground, the raised heads somewhat resembling the true Creeping Devil Cactus of Baja California In another bed is *Cereus xanthocarpus*, advertised as the most massive cactus in the Garden, its approximate weight being five tons. An iron pipe support has been placed around it to keep the arms intact. The huge base is wrinkled and looks like the hide of an old elephant. The branches arise from the base and rebranch above. Since it flowers and fruits heavily each year there is an abundance of seed which is distributed all over the world to botanical institutions. The Missouri Botanical Garden has received seed of

it and already seedlings are becoming established in our collection. The plant hails from Paraguay.

All the important species of Cereus are represented in the collection, and during the summer and early fall quantities of large nocturnal flowers are produced. *Cereus Huntingtonianus*, named in honor of the founder of the Garden, is represented by a number of fine specimens. A characteristic of this plant is that it branches extensively at the base and rebranches very heavily on the short and chubby limbs. Its general habit is to grow broader than tall. When in bloom it is unusually colorful because of the crimson outside petals.

Cereus peruvianus is one of the most widely distributed and greatly admired members of the Cereus clan. It has also the distinction of being one of the first Cacti to come to the attention of early Spanish explorers. There are a number of varieties of it scattered throughout the garden as well as a few distinct monstrose forms. All these plants were planted in their present locations about forty years ago. From the specific name one would suppose it came from Peru, but Uruguay is probably its home, and there is no record that it has ever been found indigenous to the western slopes of the Andes. *Cereus jamacaru, C. alacriportanus* and *C. Dayami* are other tall Torch Cacti on exhibition. *C. jamacaru* produces bluish branches at first, later becoming

Mounds of beautiful Pincushion Cacti nestle between rocks and boulders at the Huntington Botanical Garden.

dull green. The other two are quite distinct and inhabit forests in Uruguay, Paraguay and Argentina.

Since *Echinocactus Grusonii* grows well in cultivation it is no wonder that hundreds of beautiful "Golden Balls" are scattered in the beds. Many of them were raised from seed sown forty-five years ago and have grown into magnificent specimens. Although they do not sprout regularly from the base, many individuals will produce innumerable additional heads around the basal portion just to be different. Ferocacti are similar in appearance but present a more ferocious aspect as they are well armed with long, thick and stiff spines, some of them wickedly hooked. The flowers of the different species vary greatly in color, whereas those of *Echinocactus* are usually yellow.

Echinopses are South American Cacti of globular, cylindrical to columnar habit with long-tubed flowers that resemble Easter Lilies and commonly are dubbed that by cactophyles. Flowers are borne freely on the sides of the stems and are of exquisite beauty and often delicious fragrance. Many of the Echinopses were in full bloom, mostly with white flowers, but those of *Echinopsis multiplex* were delicate pink.

Astrophytums were also blooming freely. These are dwarfish Mexican Cacti, always raised from seed as they very seldom produce offsets unless injured. The most popular is the "Bishop's Cap," entirely spineless but densely dotted with minute white star-like scales or hairs, which give it a stone-like appearance. Pale yellow flowers crop up repeatedly throughout the summer and autumn when days are sunny.

There are vigorous clumps of *Euphorbia coerulescens* and *E. pseudocactus* in the garden. The former is the "Blue Spurge," so called on account of the peculiar shade of the vigorous branches. It multiplies by means of rhizomes which spread underground and give rise at intervals to stiffly erect young plants. The yellowish-green V-shaped bands on its green branches are characteristic, although some plants are entirely without such markings.

Because the Aloes are of special ornamental value, they are much used in the Huntington Garden. They range from small, bushy plants to large branching ones twenty-five to thirty feet high. Around the Torch Cacti one often sees *Aloe vera*, whose leaves are used as a remedy for burns, particularly in X-ray and radium cases. A striking plant is *A. plicatilis*, with its many clusters of strap-shaped leaves arranged like open fans. Another unique species is *A. speciosa*, whose rosettes of leaves are almost invariably tilted sideways. One of the handsomest, the best known, and easily grown is *A. Salm-Dyckiana*, which probably is of hybrid origin.

Agaves or Century Plants are scattered over the major portion of the Garden and can be recognized even by the amateur when they produce flowering shafts up to twenty-five feet high. Similar in habit are the

Furcraeas, which often are even more spectacular. Beschornerias are close relatives, though generally much smaller and with soft grayish-blue grass-like leaves.

Conspicuous throughout the beds are Yuccas, denizens of the American deserts. *Yucca australis* is easily recognized as it produces a pendent spike crowded with hundreds of white flowers, whereas most of the other species have upright spikes. This yucca grows in northeastern Mexico and was particularly abundant around La Rosa in Coahuila, where the writer once went in search of the elusive *Ariocarpus Kotschoubeyanus*, a "Living Rock" cactus named for a European patron of horticulture who paid a thousand francs for one of these plants. Sotol plants (Dasylirions) are also prominent in the collection as well as Nolinas and Beaucarneas because of their ornamental value.

The desert garden at Huntington contains perhaps the best collection of xerophytic Bromeliads under cultivation. Given plenty of room to develop, these pineapple relatives often form massive clumps because they multiply rapidly by means of underground stolons. Most of the varieties bear marginal prickles on the leaves, and since they are quite pungent one almost has to wear a suit of armor to work among them. However, the plants adapt themselves nicely to outdoor conditions in southern California and usually carry spectacular flower-stalks from two to eight feet tall with hundreds of flowers in unusual shades of green, blue, yellow and maroon. Plants of *Bromelia Balansae*, for instance, are living flames when in bloom, the inner leaves having turned a brilliant scarlet-red and hence the name "Heart of Flame." The Puyas are exciting flowers from the Andes region. *Puya alpestris* produces large flowers of a peculiar bluish-green color that is hard to describe. Some South American Dyckias, strewn all over the ground, were still in bloom. They are usually smaller plants than the Puyas, with more slender stalks of yellow or orange flowers. *Dyckia sulphurea* is one of the best for pot culture and often is used in dish-gardens.

For anyone interested in Cacti and Succulents the desert collection at Huntington is a veritable paradise. It is impossible to do the Garden in one afternoon and many visitors come back again and again. The writer has visited the Garden on two separate occasions and spent two and one-half days there but feels that he has not seen everything there is to be seen.

Retracing steps toward the entrance, one may continue to other parts of the estate. The Rose Garden and the Japanese Garden are beyond the Library Building and the Art Gallery. The spacious lawn in front of both buildings contains a trim evergreen hedge, Washingtonia palms, and hosts of interesting semi-tropical trees. A massive *Araucaria Bidwilli* demands attention, and several different kinds of Erythrinas catch the eye especially when the tips of branches are resplendent with thick coral blossoms.

From the Rose Garden the path leads to the very picturesque Oriental section, but before entering it pause to admire the pergola erected for the Wisteria vines. The concrete supports are replicas of tree trunks and branches upon which the fragrant Chinese Wisteria leans and twines. The first sight of the red-painted, semi-circular bridge which spans a portion of the lagoon is breath-taking. Stone pagodas and other Oriental ornaments are deftly placed to create an authentic atmosphere, and a tea house was even brought in from Japan and rebuilt on the hillside overlooking the lagoon. All the shrubs, plants and trees used in the Japanese Garden have an Oriental flavor. Shade-loving Camellias and Azaleas are planted near by where handsome native Oaks provide both the necessary shelter and a beautiful setting. Most of the well-known species, varieties, and hybrids suitable for outdoor planting are contained in the collection.

Mr. William Hertrich beside a 45-year-old Golden Ball Cactus which he raised from seed.

Mr. Hertrich, the grand old man who supervised all the developments on the Huntington estate, still takes an interest in all the projects but most of the actual administrative work has been turned over to the likeable Ronald B. Townsend, the present director, who is doing a marvelous job. The writer's thanks also go to Mr. Schneider and Mr. Geschwind for their kind attention during his visit. Yes, the Huntington Botanical Garden is a "Paradise on Earth," particularly for the Cactus enthusiast.

(To be Continued)

Book Reviews:—

Hollies. By H. Harold Hume. 253 pp. The Macmillan Co. New York, 1953. $6.75.

It is the publication of such volumes as this recent one by H. Harold Hume that indicates we are at last reaching horticultural maturity in this country. Here is a complete account of garden hollies, the botanical background, the history of the cultivated sorts, together with directions on culture, propagation, and even chapters on the holly in folk lore and on the management of holly orchards for the Christmas trade. There are nine handsome full-page plates in color, many striking black-and-white photographs, useful line drawings, and a summary of the hollies which are used for such caffeine drinks as *mate* and "black draught."

The author knows whereof he writes. His interest in hollies is of long-standing. A few of his statements as to hardiness will have to be taken cautiously in the St. Louis area, but it is a fascinating and informative and challenging book for any gardener.—E. A.

Azaleas-Camellias. By H. Harold Hume. 93 pp. Revised edition. The MacMillan Co. New York, 1953. $2.50.

In the preface the author states that the current edition covers the essentials for the beginner and brings up to date the many changes in the culture of Azaleas and Camellias which have occurred since the first edition was published in 1931. Professor Hume ably conserves space by combining information whenever it applies to both Azaleas and Camellias, as in the chapter on Propagation and again in discussing their location requirements and the usefulness of the two groups in gardens. He carefully segregates the information on noteworthy varieties of Azaleas and Camellias into separate chapters. Planting, cultivation and care, feeding, as well as pests and troubles, are excellently presented because the information is concise and definitely states When, What and How to Do. Prof. Hume also tells in a few words why it is desirable to water the plants during periods of drought. We all know that, but he also packs into a short sentence why it is desirable to water the plants after a period of severe cold weather. The tone and attitude developed through many years of outstanding learning and love of these plants are shown, not by emotional phrases, but by definite factual information and by specific instruction for the grower. This book is recommended reading. It is an excellent base for amateur gardeners who desire to learn how to grow these plants which attract favorable attention by their foliage and stop conversation by their brilliant and generous display when in bloom.—C. Barbre.

NOTES

The "Saga of the Meramec."—On Friday, Saturday, and Sunday, September 18-20, the Arboretum will become a demonstration and testing ground of land use and the scene of a play "The Spigot on the Hill." In the afternoons all sorts of machinery and equipment which have a use in modern farming or which are especially designed for conservation work will be shown in action. Many of these machines are new; some are only pilot models but they give a clue and indication of what lies ahead in land use. A wide variety of educational exhibits consisting of soil testing, forestry, game management, and hydrographic studies will be presented. As an illustration of the elaborate planning involved, it might be pointed out that a Diesel generator unit of 100 H.P will be required to furnish lights for the performance of the play.

The play to be given each evening at 7 o'clock was written by Mrs. Patterson Gephart and will be produced by the Community Playhouse. It tells the story of a pioneering man and his wife in search of "new" land; how they settled on the Meramec River; the decline of the land under hard usage; and the final rejuvenation of the soil.

The entire program is under the sponsorship of the Friends of the Land and the *St. Louis Globe-Democrat* and marks a departure from the traditional custom of the Arboretum in that an effort will be made to attract many thousands of visitors. A charge of $1.00 will be made for seats for the performance of the play, tickets for which can be obtained from the members of all Garden Clubs.

Dr. Norton H. Nickerson, who received his doctor's degree from the Shaw School of Botany of Washington University in June, was appointed to the botany staff of the University of Massachusetts, Amherst.

A course in Elements of Horticulture will be given by Mr. Robert J. Gillespie at Washington University on Thursday evenings during the fall semester. It will consist of a weekly lecture and laboratory period on such topics as plant propagation, soil structure, fertilization, care of lawns and gardens, plant breeding, etc. The second half of the course will be given in the spring.

A clipping from a London newspaper recently sent to Mr. G. H. Pring stated that the steel arches that decorated The Mall for the Coronation are going to Kew Gardens to be used in the reconstruction of the Palm House. Sir David Eccles, Minister of Works, at a dinner of the Parliamentary Press Gallery at the House of Commons, announced that "a splendid architect" had

produced a most exquisite sketch showing the arches in their new role. The treasury is prepared to spend £250,000 (over $700,000) on the re-erection.

Visitors to the Garden library and herbarium during the summer months include the following: Mr. J. G. Bacher, Horticulturist, of Portland, Oregon; Dr. William L. Brown, of Pioneer Hi-Bred Corn Co., Johnston, Iowa; Dr. Edward F. Castetter, of the University of New Mexico, Albuquerque; Mr. Gordon W. Dillon, Editor, *American Orchid Society Bulletin*, Cambridge, Mass.; Dr. Carl C. Epling, of the University of California, Los Angeles; Dr. Alfred G. Etter, of Malvern B. Clopton Experimental Farm, Clarksville, Mo.; Dr. David H. Fairburn, Director of McKee Jungle Gardens, Vero Beach, Fla.; Dr. Charles B. Heiser, Guggenheim Fellow from Indiana University, Bloomington; Dr. Hugh H. Iltis, of University of Arkansas, Fayetteville; Miss Margaret K. Lancaster, of the Morris Arboretum, Philadelphia; Dr. Mildred E. Mathias, of University of California, Los Angeles; Dr. Dwight M. Moore, of University of Arkansas, Fayetteville; Dr. F. Marion Ownbey, of Washington State College, Pullman; Mr. John Spoehr, of University of British Columbia, Vancouver; Mr. Robert A. Vines, Director of the Museum of Natural History, Houston, Texas; Dr. and Mrs. Richard Walker, of the University of Washington, Seattle.

Session on Forcing Winter Bulbs.—A lecture and practice session on the Forcing of Winter Bulbs will be held at 1:30 p. m., on October 28, November 4, and November 11, and at 9 a. m. on October 27 and 29, November 3, 5, 10, and 12, at the Experimental Greenhouse. It will consist of a lecture and demonstration by the Garden's Horticulturist, Mr. Robert J. Gillespie, followed by actual potting of the bulbs by each member of the class. A registration fee of $5.00 covers not only the lecture and demonstration but all materials used: flower pots, soil, and one pan each of Paper White Narcissi, Yellow Daffodils, Double Tulips, Hyacinth, and Yellow Calla Lilly. For those without facilities for storing the bulb pans, the Garden will provide space until time to bring them to light.

Participants should specify the day they wish to attend, and second choice should be given since each session will normally be limited to 20 students. Any garden club or similar organization may reserve one session exclusively for its members, upon the payment of $50.00, the fee for ten participants. For more than 10 members, the balance can be paid at the session reserved for the club, though not more than 25 can be accommodated on any one day. Registration will be closed October 15—those applying first will be given preference. Applications should be accompanied by the fee and addressed to Mr. Robert J. Gillespie, 2315 Tower Grove, St. Louis, Mo. A card of admission will be sent promptly upon receipt.

THE MISSOURI BOTANICAL GARDEN

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SOME FACTS ABOUT THE GARDEN

The Missouri Botanical Garden carries on the garden established by Henry Shaw over a century ago at "Tower Grove," his country home. It is a private institution with no public support from city or state. The old stone walls and cast-iron fences, the Linnean House, the Museum, the Mausoleum and the "Old Residence" all date from Mr. Shaw's time. Since his death, as directed in his will, the Garden has been in the hands of a Board of Trustees who appoint the Director.

The Garden is open every day in the year (except New Year's Day and Christmas) from 9:00 a. m. until 7:00 p. m., April to November, and until 6:00 p. m., November to April, though the greenhouses close at 5:00 p. m. The Garden is nearly a mile long and has several entrances. The Main Entrance, the one used by the general public, is at Tower Grove and Flora Place on the Sarah bus line. The Southampton buses (No. 80), direct from downtown, pass within three blocks of this entrance and stop directly across the street from the Administration Building at 2315 Tower Grove. The latter is the best entrance for students, visiting scientists, etc. It is open to such visitors after 8:30 a. m, but is closed on Saturdays, Sundays, and holidays. There is a service entrance on Alfred Avenue, one block south of Shaw Avenue.

Since Mr. Shaw's time an Arboretum has been developed at Gray Summit, Mo., opposite the junction of routes 50 and 66. It is open every day in the year and has two miles of auto roads as well as foot trails through the wild-flower reservation. There is a pinetum and an extensive display of daffodils and other narcissi from March to early May.

MISSOURI BOTANICAL GARDEN BULLETIN

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Missouri Botanical Garden Bulletin

Vol. XLI OCTOBER, 1953 No. 8

THE NEW QUEEN VISITS THE GARDEN

On the Saturday after her coronation the new consort of the Veiled Prophet of St. Louis visited the Garden with her official Maids and received the greetings of more than 4,000 school children. The affair was arranged at the request of the Board of Trustees by a committee under the chairman-

ship of Mrs. Walker Hill. Henry Shaw's old residence "Tower Grove" was opened for the event. The Queen and her four special maids occupied a raised platform set up in the west parlor which had been decorated by the committee, and the other maids of honor took up informal positions on the main stairway in the reception hall. A harpist provided appropriate music throughout the afternoon.

Miss Julia Terry, Queen of the Veiled Prophet

The white and silver of the Queen's train and the white and silver gowns of the special maids provided an effective background for the spectacular bouquet of orchids held by the Queen. It was as a gesture of thanks for the gift of these orchids that the Queen made her official visit. The visitors entered in double-file and for most of the afternoon the line of children and parents extended down the steps, around the entrance circle and along the old walk through the mausoleum grounds.

It was quite an afternoon. The weather was perfect; the combination of orchids, debutantes, and handsome ball-gowns was breath-taking, and every one rose to the occasion. A group of women from the Federated Garden Clubs, dressed in the clothes of Mr. Shaw's day, walked about the grounds and helped the children to while away the time during their long wait. Little girls were allowed to take a short stroll carrying the funny, old-fashioned sun-shades, and little boys were amused by the way hoop-skirts and bustles bobbed along behind as the ladies walked.

INTIMATE JOURNEYS TO CALIFORNIA GARDENS

(Continued from September BULLETIN*)*

LADISLAUS CUTAK

LOS ANGELES STATE AND COUNTY ARBORETUM

Readers of this BULLETIN will be particularly interested in the Los Angeles State and County Arboretum, for it is now under the supervision of Dr. Russell J. Seibert, a former student at the Garden and graduate of the Henry Shaw School of Botany. The Arboretum, founded through the efforts of the Southern California Horticultural Institute, is located in the City of Arcadia and adjoins the famous Santa Anita Race Track where the richest purses for horse-racing in this country are offered. Even though the Arboretum is not yet open to the public, inspection of the grounds can be made by appointment. Plans for the Arboretum were being formulated as early as 1947, but actual construction was not begun until 1950. It will be several more years before the entire area will be made ready for the public's use.

The most striking feature of the 123-acre tract is the tropic lagoon fringed by luxuriant verdure. It is so attractive and naturalistic that movie studios have used the setting for a number of South Seas epics. It has also been the locale for other jungle films—"Devil's Island", "Anna and the King of Siam", "Saigon Incident", "Objective Burma", "The Buccaneers", and "Distant Drums." Even the popular Tarzan and Jungle Jim movies are shot here. Adjacent to the lake are several buildings of historical interest, including the Queen Anne Cottage, Coach Barn, and the Hugo Reid Adobe House, which are now being restored as nearly as possible to their former condition.

The land upon which the Arboretum is situated originally belonged to the Indians, but when the Spaniards arrived they took possession in the name of the King of Spain, who presented it to Mission San Gabriel in 1771. When Mexico severed its ties from Spain, the land was confiscated by the revolutionary government and rented out. Known as Rancho Santa Anita, it passed into the hands of Hugo Reid, a Scotchman, who married an Indian woman. It was Don Hugo who built the adobe house in 1839 on the banks of the picturesque lake, and this building is next on the list to be restored by the California Arboretum Foundation, a non-profit organization dedicated to restoration of historical buildings.

Rancho Santa Anita has passed through a series of ownerships since Hugo Reid acquired it, the most famous being Elias J. Baldwin, better known as "Lucky" Baldwin, who bought the property in 1875 and lived there until his death in 1909. The fabulous Baldwin was an Ohioan by birth and a

Date Palm and Castor Bean along the Lagoon

shrewd businessman. At the age of twenty he operated three boats transporting grain from Chicago to St. Louis, and in 1853 he decided to try his luck in California. He invested heavily in hotels and livery stables but found greater success in mining, from which enterprise he acquired his nickname, "Lucky."

"Lucky" Baldwin, like our own Henry Shaw, loved plants. When he acquired and subdivided his land he planted many fruit and nut trees, experimented with beverage plants, and maintained a large vineyard. After his death the estate was neglected. In 1947 the State of California, in conjunction with the County of Los Angeles, purchased 111 acres of the Baldwin estate for an Arboretum. The following year the California Arboretum Foundation was incorporated for the express purpose of raising private funds for Arboretum maintenance and operation. In 1953 the duties of the organization were turned over to the County of Los Angeles, which created a Department of Arboreta and Botanic Gardens for the purpose of operating, maintaining, and developing the Los Angeles State and County Arboretum. The Foundation will now operate for the restoration of the historical buildings on the grounds and raise funds for horticultural and educational projects contemplated at the Arboretum. The Foundation has already restored the Queen Anne Cottage, a quaint wooden structure of gingerbread design built in 1881, which was once the Baldwin guest house and art gallery.

Inadvertantly, the visitor is drawn to the jungle area around the lake, for without a doubt it is the most bewitching portion of the grounds. In the spacious lawn which extends from the road to the Queen Anne Cottage, one will find many fine old specimens of the Sentinel or Washington Palm. There are two forms planted, the lofty, slender-trunked type, inappropriately but correctly known as *Washingtonia robusta*, and the smaller but heavier *W. filifera*. Both tower above the surrounding trees, and their graceful silhouettes cast reflections on the placid waters of the lagoon. The Washington Palm is indigenous to the canyons around Palm Springs where the trees grow plentifully. They are now frequently utilized as street trees in our Southwestern cities. A distinguishing character of the palm is the heavy "skirt" of dead leaves which hug the trunk in adult specimens. If left undisturbed the skirt will cover the entire length of the trunk, but in cultivation it is the practice to trim off the lower leaves. A nice stand of Washingtonias appears on the opposite shore of the lagoon from the Queen Anne Cottage. The taller specimens, with their characteristic skirts, and several younger individuals stand out sharply against the dense jungle brush. Date Palms (*Phoenix dactylifera*) are also included in the collection, producing long feathery fronds in contrast to the leafy fans of Washingtonias. A very striking Date Palm grows along the bank just in front of the Adobe House. Its trunk leans far out over the lagoon and is a natural prop for photographers who use it as part of the background when portraying alluring women in bewitching costumes.

Around one end of the lake where the vegetation is exceptionally heavy a trail has been trod out with deviating by-paths that may lead to the water

or a small clearing. If you have thrived on jungle movies it wouldn't be too hard to visualize naked savages stalking the trail or wild animals moving like shadows through the dark bush. Here and there a fallen tree lies across the path and there has been no attempt to remove it. Instead, it is allowed to remain just as it would have in the real jungle.

When the movie studios come in to shoot scenes their experts place flamboyant flowers and exotic foliage along the trail; stuffed wild animals in the underbrush; or perhaps even a mechanical crocodile in the lagoon to add realism to the scene. A small village may be built at one end of the lake, and presto! the whole area is transformed into the South Seas, Burma, or swamp-ridden Brazilian Matto Grosso. When the movie people leave, all their mechanical equipment is taken away, the place cleaned up, and peace restored. The writer was simply enthralled by the "jungle area" which is the best attraction in the Arboretum for the sightseer, the photographer, and naturalist.

The Arboretum is striving to become a horticultural center for disseminating knowledge concerning the use of the many exotic plants which can be grown in southern California; to establish a school for training gardeners and garden supervisors; to provide a library and a herbarium where specimens can be readily identified; to become a publication center for gardening literature; and to establish a bird sanctuary.

The Los Angeles State and County Arboretum is under the able supervision of Dr. Russell J. Seibert, who was appointed director in 1950. Born and raised on a farm in Illinois, he did undergraduate and graduate work at Washington University, St. Louis, and during the summers of 1935, 1937 and 1938 collected for the Missouri Botanical Garden throughout Panama. In 1940, when the Japanese cut off the rubber supply in the Far East, the United States set up the Office of Rubber Investigation to conduct research work in Latin America in an effort to increase hemispheric production of natural rubber. Seibert was called in on the work as botanist and did field work in Panama, Costa Rica, Venezuela, Colombia, Haiti and the Dominican Republic. In 1943-1946 Seibert and his wife, Isabelle (daughter of the superintendent of the Missouri Botanical Garden), lived in Peru where he carried on a program of study, selection, and collection of Hevea rubber trees in the jungles of Peru and adjoining countries.

Plans are going forward swiftly for opening the Old Residence to visitors at the earliest possible moment. Two or three different committees are at work on such different problems as guides, costumes, furniture, and repairs. The old Museum near by is now open whenever a staff member is on hand.

THOUGHT FOR FOOD FROM ALGAE

EMANUEL D. RUDOLPH

Most of us are familiar with a few seaweeds or at least with the green scums that can be found at times in our ponds and lakes. These are plants that are representatives of a large group of organisms called the Algae. Many of them cannot be seen without the aid of a microscope, when they are scooped up from the fresh or salt water in which they live. The tantalizing notion that some of these microscopic green algae could be cultivated and used to solve the world's food problems has been proposed by a number of people recently, and much information on the subject has been brought together in a publication of the Carnegie Institution of Washington.[1]

It has been estimated that about 90 per cent of the organic material manufactured by plants on the earth from the sun's energy is accomplished by microscopic algae. Since all animals are ultimately dependent upon food produced by plants from carbon dioxide (a gas found in small quantities in the air) and water, using the energy provided by sunlight, any group of plants that produces so much potential food should be of interest to us. In nature, these algae are eaten by small water animals which finally are eaten by fish; so when we have a fish dinner, we are benefiting from "the grass of many waters", the algae. The present idea is to make direct use of the food provided by these plants instead of waiting for the other "middle men" of the food chain, the marine animals and fish, to wastefully utilize them. These algae would make wonderful crop plants since the whole plant could be used instead of having to leave stalks and the like as we do with our present crop plants.

There are a few questions which one would like to have answered before embarking on any project to make use of these hitherto almost untapped food sources. The first query naturally would be, are these organisms nutritionally valuable and are they tasty as human and domestic animal food?; and second, can we economically process the algae into available food? The recent Carnegie Institution publication and the reports of other scientists have provided some of the answers to these questions. Let us see what has been found.

These microscopic green algae, mostly the genus Chlorella, have been used, grow very rapidly, and contain on the average 50 per cent protein.[2] This amount can be varied somewhat by the conditions under which the organisms are grown. Protein is the very important constituent of food

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[1] Burlew, John S., editor. Algal culture from laboratory to pilot plant. Carnegie Institution of Washington Publication No. 600. 357 pp. 1953.

[2] Spoehr, H. A. *Chlorella* as a source of food. Amer. Philos. Soc. Proc. Vol. 95, pp. 62–67. 1951.

A culture of mixed microscopic algae. They give the water in the glass dish a dense green turbid appearance.

that is so lacking in the diets of people in many parts of the world. In fact, these green algae are found to have just about the right kinds of building blocks in their proteins (the amino acids) for good animal food. According to Sir Herbert Broadley in a report of the United Nations Scientific Conference on the Conservation and Utilization of Resources (1949), the world needs an increase in the pre-World War II amounts of meat, the major protein provider, of 46 per cent by 1960 to keep the world's people adequately fed. In the U. N. "Food and Agriculture Organization's State of Food and Agriculture Review and Outlook" for 1951, we are told that by 1951 there has been only a 6 per cent increase in meat production over the pre-World War II average. Thus, at the present rate of increase, we are not meeting the protein needs of the world's inhabitants. It can be seen, also, from the Second World Food Survey of the F.O.A. (1952) that the amounts of proteins eaten by various peoples vary tremendously. For example, in Indochina in 1949, a person received on the average 36 grams of protein per day, while in Argentina a 102-gram average prevailed. An Argentinian eats about three times as much protein as an Indochinese. The United States is high up on the protein intake list, with an average of 90 grams per day, but there are many countries down at the other end of the list with Indochina. An adequate daily protein intake has been said to be about 65 grams. If by using microscopic green algae we can increase the protein intake of the needy

people of the world and give them a new lease on life, we would really be making a vital contribution to a better world. It is therefore not just an academic question, this growing of algae for food, but one well worth considering carefully.

Already some experiments have been made using microscopic green algae as food. In Venezuela, a soup made from mixed algae (plankton) grown in large open bird-bath-type containers was fed to lepers as a supplement to their diets for about four years with some success. In the few experiments using Chlorella dietary supplements for rats and chicks the results were not too conclusive, but the experiments are so few that we cannot get definite answers as yet. We need and certainly shall get more information on the value of these green algae as food items for man and his domestic animals.

One other way of increasing the available protein is by increasing the amounts of fish eaten. With the fish-pond culture program that the U. N. is establishing in some countries, for example, Haiti, this may be accomplished. The addition of greater amounts of algae, provided they do not get out of hand, to these ponds would increase the fish population. This then is another possible use of microscopic algae in some places for increasing their available protein supply. Naturally, this is not the most efficient use of the algal protein but it does not require any machinery.

If there is a demand for algae as food, can it be provided in large quantities? All indications, even though they are preliminary, show that Chlorella could be grown in bulk. There are several experimental plants in operation in this country and in Israel and Japan. With larger quantities of dry algae available, experimentation on its uses as indicated by the Carnegie report will be forthcoming. The picture painted for us by some of the people engaged in growing these algae is most optimistic, "Assuming that one half the per capita requirement of 65 grams of protein a day was to be obtained from algae, the total area required for algal culture would be less than a million acres for the present world population (an area a little bigger than the state of Rhode Island)."[3] A chemist who recently wrote a book entitled "The Road to Abundance"[4] pictures our future diet to consist of synthetic carbohydrates and fats with the proteins derived mainly from microscopic algae.

It is easy to see how people could get carried away by the promise that these microscopic green algae hold out, but we should not overlook the serious obstacles that still remain. While processed green algae is quite nutritious, it has negative palatability points; its unpleasant taste (but that

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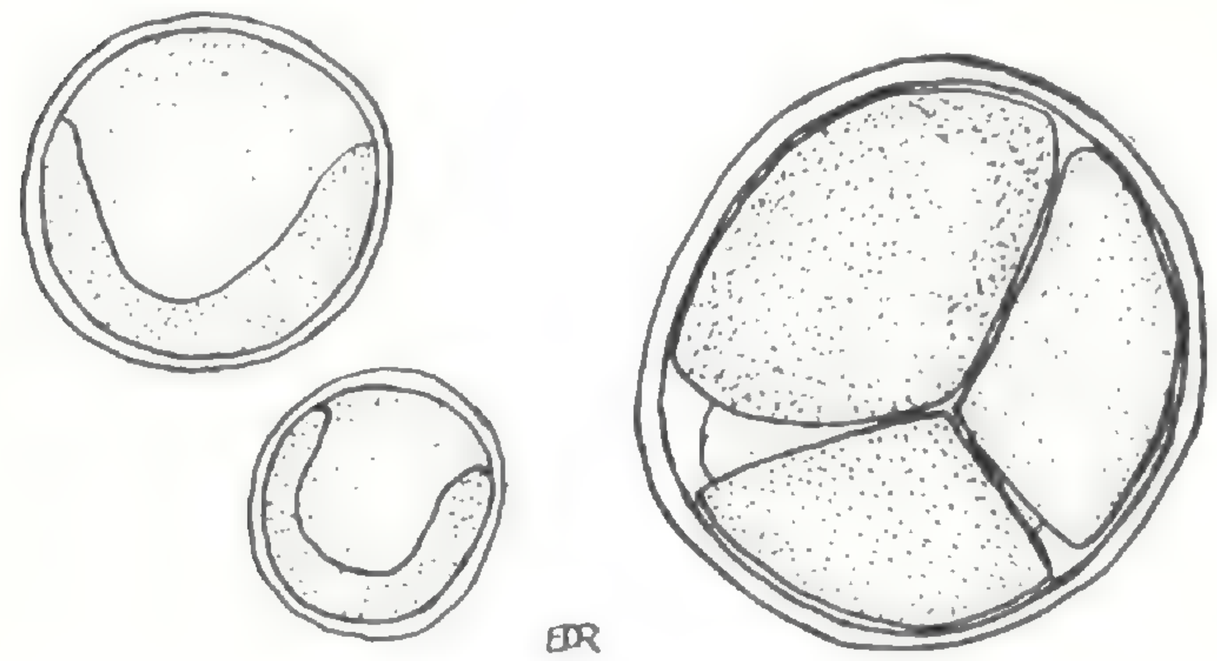
[3] Burlew, John S. loc. cit.

[4] Rosin, Jacob, and Max Eastman. The Road to Abundance. McGraw Hill Book Co. 166 pp. New York, 1953.



Chlorella as seen under a microscope. Each cell is smaller than a needle tip.

may be somewhat overcome by using it in conjunction with other materials in soups), and its ability to swell greatly when water is added, making it difficult to eat in large amounts. Then, too, the industrial plants for growing these algae would have to utilize sunlight, since artificial light would be too expensive, and it is evident that sunshine cannot be counted on all the time. It also would seem that an algae-growing and processing plant would be expensive to build and could certainly not be undertaken by those countries that need the protein most, without considerable outside aid of money and technicians. One example of a real problem is keeping the algae cool when they are grown in the sun, because they grow best at moderate temperatures. With further experimentation, many of the technological problems can be solved, but the edibility and cost problems will remain.

We do not, I think, soon face the probability of finding all of the farm lands abandoned and Chlorella tanks taking their places as one scientist has envisioned,[5] nor of munching on Chlorella steaks rather than sirloin ones. We can, however, certainly look forward to much greater use being made of microscopic algae, and perhaps the time will come when we shall cast our bread upon the waters and see it multiplied many fold.

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[5] Meier, R. L. Industrialization of photosynthesis and its social effects. Chem. Eng. News Vol. 27, pp. 3112–3116. 1949.

On the Sunday immediately following the visit of the Queen and her maids the Old Residence and the near-by Museum were open to all visitors. Special invitations were sent out to the Friends of the Garden and a number of architects and local historians. Both buildings were on display from cellar to garret, with guides to show visitors around and answer questions. It made an effective demonstration of the charm of these interesting old buildings and the kinds of problems that are being met in putting them into more general usefulness.

THE HORTICULTURAL COUNCIL

EDGAR ANDERSON

After a long series of preliminary discussions the Horticultural Council of the Missouri Botanical Garden was formally organized on Monday evening, September 28. It consists of a board of fifteen members, representing as widely as possible the amateur and professional horticultural and botanical interests of the St. Louis area. Included on it are leading members of such organizations as the Federated Garden Clubs, the Men's Garden Clubs, the Garden Club of America, the local Rose, Iris, Dahlia, Herb, and Orchid societies, as well as representatives from the nurserymen and the landscape architects. The Director of the Garden and the President of the Board of Trustees are *ex-officio* members. It will be a self-perpetuating group, with approximately a third of the members being changed each year and with no one other than the *ex-officio* members serving more than three successive terms.

The chief purpose of the Council is to integrate the work of the Garden with horticultural and botanical interests in St. Louis. It should put the Garden in more direct touch with various horticultural developments and allow the Garden to use its assets more effectively. The members will also serve individually as centers of informed understanding about affairs at the Garden. As of October 1, 1953, the Council is made up of the following members, with one yet to be chosen: Clarence Barbe, Albert C. Chandler, E. G. Cherbonnier, Paul Hale, Mrs. Hazel L. Knapp, Emmet Layton, Mrs. James McClure (Eleanor B.), Clarence McGovern, John E. Nies, W. F. Scott, Jr., Mrs. J. Garneau Weld, Harold E. Wolfe, John S. Lehmann, Edgar Anderson.

BOOK REVIEWS:—

Your Guide to a Greener Lawn. By Goeffrey S. Cornish. 63 pages. Massachusetts Horticultural Society, Boston, Mass. 1952. 75 cents.

This attractive pamphlet, published a year ago by the Massachusetts Horticultural Society, has already gone into a second printing. While written from the standpoint of the average home-owner in southern New England, most of its recommendations will hold good in the St. Louis Area. There are chapters on building new lawns and establishing old ones, on pests, diseases, and miscellaneous lawn troubles, as well as new grasses and grass substitutes (though ground covers are mentioned only in the title of one of the illustrations), and an excellent section on lawn-mowers and lawn-mowing.

The arrangement of the pamphlet is ingenious. Sub-headings in boldface type are used generously and there is a complete and conveniently ar-

ranged index. By running the eye up and down the index pages it is possible to locate the desired information in a minute or two. The style is simple and direct; the author obviously has had first-hand experience with lawn maintenance. Any one seriously interested in lawn care in the St. Louis area will want to own and to study this modestly priced pamphlet.—E. A.

Styling Corsages with Garden Flowers. By Mary Hazel Drummond. 259 pp. The MacMillan Co. New York, 1953. $3.50.

Here is the complete low-down. The author (a former Missourian now living in California) tells you exactly how to proceed in producing corsages of professional finish from the flowers, leaves, and fruits available to the average home-owner (or for that matter apartment-dweller, for she includes house plants among the recommended materials). The style is clear, and there are numerous diagrams and line-drawings showing precisely how to carry on such tricky operations as rolling rose petals or wiring heavy camellias. Nothing is omitted. You are told exactly what size of wires to use for each kind of flower and given directions as to where you can purchase them. There is, for instance, a whole chapter on the selection, purchase, and making-up into bows, of the ribbons which are so frequent a feature in modern corsages. The author is both a professional decorator and an enthusiastic gardener. She has lectured widely before amateur and professional groups. Her book has been put together with intelligence, taste, and a wide understanding of plants and of people. It is both detailed and complete, including even directions on how to make an Hawaiian *lei* and how to harden off Forsythia branches in using them for decorations at an informal garden wedding in the spring.—E. A.

Flowers of the South, Native and Exotic. By Wilhelmina F. Greene and Hugo L. Blomquist. 222 pp. University of North Carolina Press, Chapel Hill, 1953. $5.00.

A well-known botanist and a well-known botanical artist have collaborated in producing this beautiful and informative book. Really it is three books, and an editor with a truly tidy mind would be annoyed that they are not more completely integrated. The bulk of the book is made up of Mrs. Greene's black-and-white drawings, three to a page, lining the outer margins, with the text fitted in between. These drawings combine artistic excellence and botanical accuracy in a way which has been frequently attempted but seldom achieved. Mrs. Greene has a way of making the essential characteristics of a plant stand right up off the page in a crisp sketch smaller than the palm of your hand. The printed matter has been so nicely balanced that it is a pleasure just to leaf through the pages. The text gives the common and scientific names, discusses related plants which are also found in

the area, gives the range and the season of bloom, and somehow finds space for an amazing number of observations of general interest.

Inserted throughout the book and only partially integrated with it are two sets of colored illustrations. One set shows individual flowers at a slightly larger scale than the black-and-white illustrations. The others, mostly full page, are of massed bouquets showing all the flowers one might conceivably find in one area at one season. Opposite these pages are black-and-white representations of the same groups, with all the flowers numbered and listed. There are, for instance, the spring wild flowers of the southern coastal plain, some 74 kinds shown as if tastefully arranged in a large earthenware bowl. There are similar plates of such groupings as "Fall wild flowers of the Southern Mountains", and a plate showing five spring-blooming sub-tropical ornamentals in a green glass pitcher. These large plates will make the book more attractive to the general reader; they will also prove useful to the simon-pure amateur who really wants to know about the plants he is finding but has only form and color to guide him. It is too bad that some of these plates could not have been printed at a slightly larger magnification but even as they are they will be more useful to the general public than most well-meant efforts on the part of professional botanists.

Many a botanist will want to have the book for ready reference, particularly if he has to deal with the inquiring public. There is no modern technical manual covering this area, no illustrated flora, no popular guide to the wild flowers, no comprehensive manual dealing with sub-tropical ornamentals. A fifth of the book is given over to the tropical and sub-tropical ornamentals most frequently met within the deep south. Here the notes are especially helpful and include suggestions as to pruning and care. This is the book to take with you on a trip to the South and because of the section on ornamentals you will even find it of some help on a tour of the Caribbean.—E. A.

The Reh Method of Greenhouse Culture under Plastic Fiber Glass. By Frederick O. and Winifred Reh. (Shiloh Road, Belleville, Illinois). 10 pp. 1953. $2.00.

This attractively printed pamphlet brings up to date the story of Mr. and Mrs. Reh's experiences with a greenhouse deliberately designed to use modern materials and modern heating and ventilating appliances. The style is vigorous and challenging. There are three excellent illustrations showing the greenhouse from within and without and three close-ups of plants which have been grown in it. In a revealing foreword Mr. Reh concludes with the prediction that "the mechanically controlled greenhouse of the future will bring the atmosphere of the tropics into our way of life."—E. A.

Plants of Rocky Mountain National Park. By Ruth Ashton Nelson.

Revised edition, 1953. 202 pp. U. S. Government Printing Office, Washington 25, D. C. $1.00 (paper-bound).

The widow of the late Aven Nelson has re-edited and brought up to date the popular guide which she first published over twenty years ago. The names of more than 50 species have been added to those in the previous edition, so that more than 750 flowering plants, ferns, and conifers are included in this attractive booklet. There are 100 clear photographs of the most interesting species (some of them very striking) and 14 large plates which are either photographs of vegetational types or line drawings illustrating technical details. There is a bibliography of papers and books likely to be of interest to those seeking to know more about the flora of the park, an index of common and scientific names, a glossary, and a helpful index to localities.

It is called a popular guide, and so it is, but it is a good deal more. Most of those who use it will be unconscious of the meticulous scholarship which has gone into its compilation and editing. It will serve not only the needs of the general public but of the amateur and the professional scientist. Only some one who has had long experience with the general public on the one hand, and the scientific public, on the other, knows what different worlds these two classes of people live in and what different languages they speak. Making one publication serve perfectly the needs of both groups is next to impossible. The general public does not want to be bothered with the finicky technical details which the scientific public demands as its right. The scientific public feels abused if it has to consult the kind of a booklet which is perfectly suited to the needs of ordinary people. Most popular guides fall somewhere between these two stools and fail to please either group. Mrs. Nelson has come as close to satisfying the needs of everyone as is humanly possible, and the Department of the Interior is to be congratulated on having produced such a generally useful booklet at such a reasonable price.—E. A.

NOTES

The Annual Chrysanthemum Show at the Garden will be open to the public, November 8.

Mr. George H. Pring, Superintendent of the Garden, acted as one of the judges at the National Capitol Orchid Show, Washington, D. C., October 23–25.

Dr. Edgar Anderson, Assistant Director of the Garden, and Mr. Fred Meyer, Dendrologist, have been made honorary members of the St. Louis Nurserymen's Association.

Dr. Amy Gage (Mrs. Harry Skallerup), who received her doctor's degree in the Shaw School of Botany in June 1953, has received an appointment as technical assistant to Dr. C. R. Burnham, of the University of Minnesota, Minneapolis.

The third number of Volume 40 of the ANNALS OF THE MISSOURI BOTANICAL GARDEN was recently issued, with the following contents: Some American Medullosas, Henry N. Andrews and Sergius H. Mamay; The Distribution of *Diospyros virginiana* L., Harry R. Skallerup; Wildwood, a Study in Historical Ecology, Alfred G. Etter.

Recent visitors to the Garden library and herbarium include: Dr. E. L. Core, of the University of West Virginia, Morgantown; Mr. Kenton L. Chambers, of Leland Stanford University, California; Mr. Paul Allen, Director of the Fairchild Tropical Garden, Coral Gables, Florida.

Two of the herb gardens on display October 9 and 10, during the "Cook's Tour" (exhibit of kitchen and herb gardens in the St. Louis area) were at the Missouri Botanical Garden—that of the St. Louis Unit of the American Herb Society, just east of the Administration building, and that of Dr. and Mrs. Anderson, at the Cleveland Avenue gate-house.

Woodcocks now nest every year at the Missouri Botanical Garden Arboretum at Gray Summit, and members of the staff have seen young chicks on several occasions (see September 1948 BULLETIN). Last spring (May 11 to be precise) Mr. Louis Brenner with the help of his "good Ole Setter", discovered the nest which is here illustrated. Though the woodcock inhabits moist woods and stream banks, the nest, as in this example, is more often in the uplands, and the eggs are laid in a shallow basin of dry leaves and grasses.

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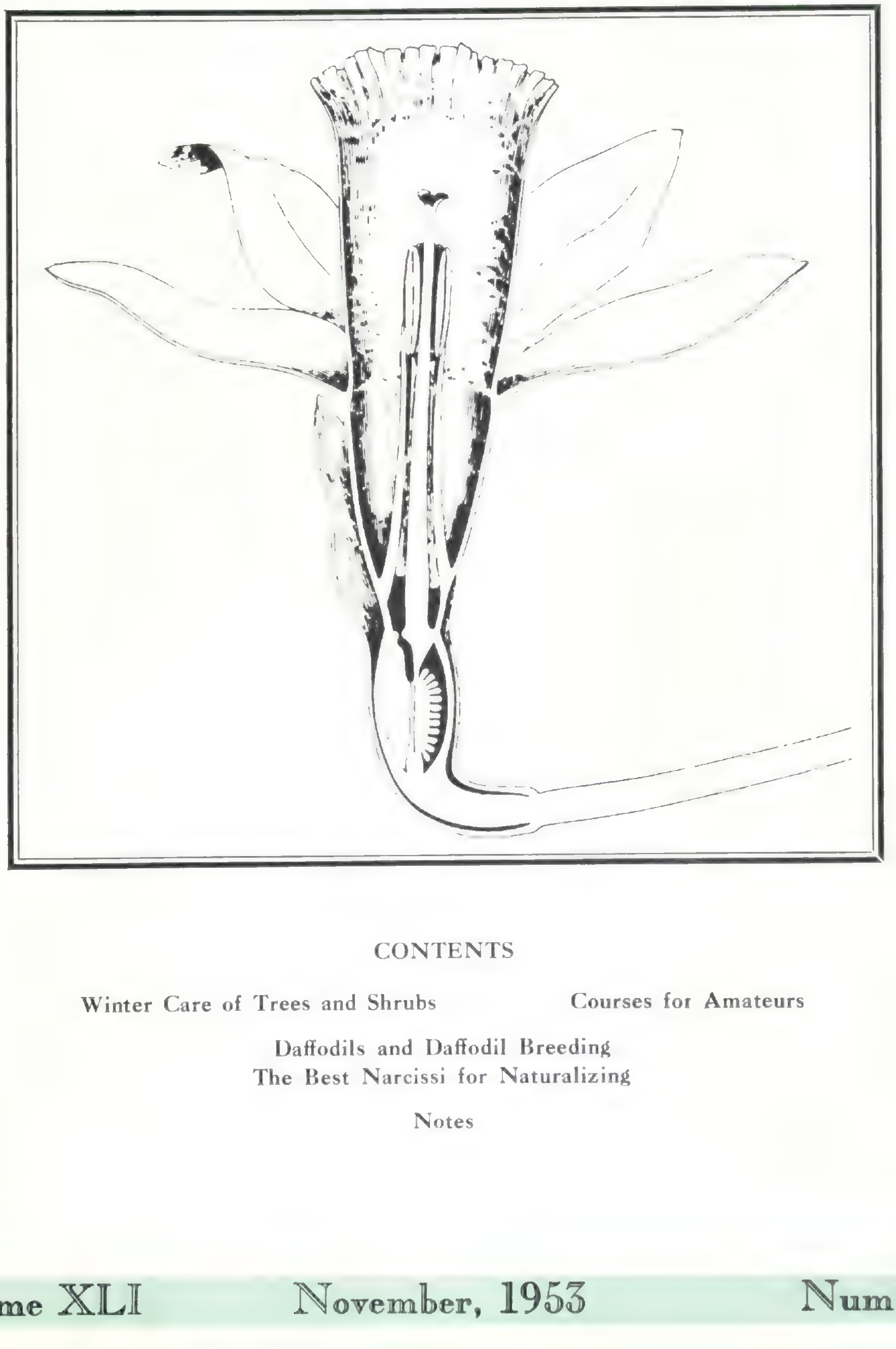
SOME FACTS ABOUT THE GARDEN

The Missouri Botanical Garden carries on the garden established by Henry Shaw over a century ago at "Tower Grove," his country home. It is a private institution with no public support from city or state. The old stone walls and cast-iron fences, the Linnean House, the Museum, the Mausoleum and the "Old Residence" all date from Mr. Shaw's time. Since his death, as directed in his will, the Garden has been in the hands of a Board of Trustees who appoint the Director.

The Garden is open every day in the year (except New Year's Day and Christmas) from 9:00 a. m. until 7:00 p. m., April to November, and until 6:00 p. m., November to April, though the greenhouses close at 5:00 p. m. The Garden is nearly a mile long and has several entrances. The Main Entrance, the one used by the general public, is at Tower Grove and Flora Place on the Sarah bus line. The Southampton buses (No. 80), direct from downtown, pass within three blocks of this entrance and stop directly across the street from the Administration Building at 2315 Tower Grove. The latter is the best entrance for students, visiting scientists, etc. It is open to such visitors after 8:30 a. m, but is closed on Saturdays, Sundays, and holidays. There is a service entrance on Alfred Avenue, one block south of Shaw Avenue.

Since Mr. Shaw's time an Arboretum has been developed at Gray Summit, Mo., opposite the junction of routes 50 and 66. It is open every day in the year and has two miles of auto roads as well as foot trails through the wild-flower reservation. There is a pinetum and an extensive display of daffodils and other narcissi from March to early May.

MISSOURI BOTANICAL GARDEN BULLETIN



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COVER: Diagrammatic section of a daffodil, after A. H. Church, "Types of Floral Mechanisms," Oxford, 1908. The crown rises in the center of the flower with four of the perianth segments behind it. The stigma in the center (flanked by the stamens) leads down to the ovary at the base of the flower. See page 153 for a note on A. H. Church.

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Please: Do not discard a copy of the Bulletin. If you have no further use for yours pass it along to a friend or return it to the Garden. Return postage will be guaranteed.

Missouri Botanical Garden Bulletin

Vol. XLI NOVEMBER, 1953 No. 9

WINTER CARE OF TREES AND SHRUBS (ADVICE FOR A DRY AUTUMN)

AUGUST P. BEILMANN

Manager Missouri Botanical Garden Arboretum

The woody plants which survived this past summer are in great need of care and attention. To restore them, prepare them for the coming year, and assist them to grow normally it will be necessary to irrigate, mulch, and feed. That these practices are necessary will be apparent if we realize that hardly a single species of woody plant, in common use, was developed for the purpose for which they are used to-day. All of our shrubs, shade trees, and evergreens developed in an altogether different environment. They are now used as ornamentals because it has been found that they are quite adaptable—but even adaptability has its limitations! Only care and attention will pull woody plants through such a critical time.

Any woody plant that carried a fair share of foliage into the fall would benefit from irrigation, mulching, and feeding. Among the shrubs, those which lost their leaves in late summer will show a considerable amount of drought injury in the spring. Even those most seriously damaged will probably recover if given some help at this time. Shrubs grow from a crown at the ground line, and while most of them may need extensive pruning it is unlikely that very many of them have been killed. When in doubt, prune them back to the ground and allow the adventitious buds to replace the lost shoots. Recovery may take a few years, but it can be hastened through good care.

Shade trees present a somewhat different problem, and there are no rapid and easy solutions if many of the larger branches are dead. Pruning, of course, can be resorted to if the symmetry has not been destroyed. But recovery is slower with the massive woody plants, and there is no short-cut to the replacement of lost scaffold branches. When badly injured by the "weather" of last summer it will be easier to replant—perhaps use a better tree!

With evergreens the decision of "what to do" can be arrived at quickly. The pines, spruces, hemlocks and the other conifers in general use can be helped very greatly IF THEY SHOW NO DISTRESS. However, if they begin to lose needles quite rapidly, and perhaps rather spottily, there is no hope. For all horticultural purposes evergreens that show distress are past all help since they always appear to be in good condition until they collapse.

If your trees and shrubs show some life, begin their rehabilitation by irrigating. Water them well before the winter; the roots continue to grow and to absorb water so long as the soil temperature is above 55° F., and lower temperatures are generally not reached until December. If you irrigate, do a thorough job. Remember that many of the soils in this area will hold one inch of water per foot in depth, and the deeper the soil the deeper the root growth for both shrubs and trees. Therefore, a tree growing on the deep loessial soils near the Missouri or Mississippi rivers may require fifteen or more inches of water to satisfy its needs. The same species growing on the shallower soils in the west and southern portion of St. Louis County may have an optimum amount of moisture when four or five inches of water are applied through irrigation. Use a soaker hose or turn down the pressure and allow the water to run slowly for many hours—it would be well to check the penetration of the water by exploring with a spading fork or shovel. Be sure enough is applied to moisten the root zone. These directions apply to shrubs and evergreens, as well as shade trees.

November is an excellent time to use a mulch since the soil will not freeze quickly and the roots will remain active for some time. Mulching is important to plants which might have lost many roots through drying during the summer. It will also conserve water and therefore becomes just a matter of "good" gardening which pays dividends during dry seasons. Almost any organic matter can be applied—from two to five inches of rotted manure, compost, new leaves (weighted down) or any of the dried and packaged manures, sawdust and wood chips, or shavings. Commercial fertilizers can be easily applied along with the mulching material. When used in that way they speed up the decomposition of the mulching material and seldom cause burning. The combination can be used effectively about a specimen lawn tree, in a shrub border, or a group planting of evergreens.

COURSES FOR AMATEURS

Several courses for amateurs will be offered at the Missouri Botanical Garden during the winter and the spring. Plans for two of these courses are far enough along for definite announcements to be made.

Orchids for Amateurs.—With a little know-how and the right kind of plants some orchids can be flowered successfully in a bay-window or sun-porch. Many of them make excellent subjects for the amateur greenhouse as was demonstrated in the special BULLETIN prepared last year by the St. Louis Orchid Society. A demonstration class in potting and caring for orchids will be held at the orchid greenhouses, Missouri Botanical Garden Arboretum, Gray Summit, Mo., on Tuesday, March 9, 1954. The class will convene promptly at 10 A. M., with demonstration period from 10 to 12. During the noon hour the Garden will provide hot coffee, and class members are urged to bring their own sandwiches and enjoy a social noon hour together. The afternoon session will be from 1 to 3, and every member will be provided with an orchid plant in bud or bloom to take home as practice material. The orchid greenhouses are just off Highway 66 at its junction with Highway 50 at the edge of Gray Summit, 35 miles west of St. Louis.

Registration limited to 50. Fee $10.00, which includes all materials. If the demand is great enough a second orchid day will be arranged on Wednesday, March 17th. To register, send $10 in cash, check or money order to: "Orchids for Amateurs," Missouri Botanical Garden, 2315 Tower Grove, St. Louis 10, Missouri.

New Methods in Plant Propagation.—New methods of rooting cuttings worked out by Mr. Lewis Lipp of the Arnold Arboretum are revolutionizing the making of cuttings by amateurs and professionals alike. A demonstration class of these new methods will meet for a two-hour session on the following days in January:

Tuesday morning, 10–12 A. M., January 12, January 19, January 26.
Wednesday afternoon, 2–4 P. M., January 13, January 20, January 27.
Friday evening, 8–10 P. M., January 15, January 22, January 29.

Each student will be given all materials for constructing a "Lippigator", including a cypress wood base with supporting wire frame and plastic covering. He will also be instructed in making various kinds of cuttings and how to fill the Lippigator with them. The cuttings can then be rooted at home on a sun-porch or in a bay-window. This propagating unit can be used indefinitely in the home for a continuous supply of rooted plant materials.

Fee $10.00 for the two-hour session, which includes all materials. To register, send cash, check, or money-order to: "Plant Propagation", Missouri Botanical Garden, 2315 Tower Grove, St. Louis 10, Mo., and specify on which day you wish to come.

DAFFODILS, DAFFODIL BREEDERS, AND DAFFODIL BREEDING

EDGAR ANDERSON

In western New York, where I was born, the single yellow trumpets were known (and correctly) as daffodils, while the rather formless old-fashioned double ones (quite incorrectly) were called jonquils. These two words, jonquil and daffodil, have had a hard time in America. Over much of the country the true jonquil does not do well and the average American has never seen one; but the word itself is common in English speech. It is a good plain word with pleasant associations, and people insist on using it. There are parts of Pennsylvania where single daffodils are called jonquils, while here in Missouri single and double alike are jonquils to every florist's clerk and the word daffodil is reserved for some mythical golden bloom that no two people quite agree upon. There is no mistaking the true jonquil when you have really seen one. It has narrow dark green leaves almost like those of onions or chives, and nearly circular in cross-section. The flowers are tiny, scarcely bigger than your thumb-nail, intensely yellow and intensely sweet, several of them being borne together at the top of the flower stalk. Down in Mississippi where they do very well and are common in many old gardens, the country name for them is "honey cups", or frequently just plain "honeys."

Daffodils, jonquils, poet's narcissi, paper-whites, all of these are narcissi; all are members in good standing of the genus Narcissus. They all have the same simple ground plan. Each differs from the other in the proportions of its various parts. This is one of the fascinating things about Evolution. Nature somehow hammers out a new plan; somehow in ways that we can only guess at, she makes a Narcissus. Once made, she sticks to this basic plan for species after species. The proportions vary from one kind to the next, the colors, the textures, the season of bloom, but the basic ground-plan remains. After you have seen a few species of Narcissus there is a fascination in coming upon still others and learning the myriad ways in which the changes on this simple formula may be rung.

All of the Narcissi of the world can be described in a few simple sentences. They bloom in the winter or in spring, from an underground bulb; leaves and flowers coming up at about the same time; the flowers (one or more as the case may be) on a stout central stalk from a few inches high to upwards of a foot. The flower has six petal-like segments which are joined at their bases into a greenish tube leading down in back to a smooth green bump, the ovary, which swells into the seed-pod when the flower is fertilized. Projecting forward from the base of the segments is the strange little crown or cup which is the most distinctive feature of the genus. It may dominate the whole flower or be scarcely more than a little inconspic-

The Common Daffodil

The Poet's Narcissus

The two kinds of Narcissi from which many of our garden daffodils are descended. Both are shown at half natural size, or very near to it, as if cut down through the middle of the flower.

[These figures are from one of the most beautiful (and in modern times surely the strangest) books which has been written about flowers, "Types of Floral Mechanism," by A. H. Church (Clarendon Press, Oxford, 1908). In this volume Church's original plates are reproduced in full color at almost page size, accompanied by a text which is in part the simplest sort of Natural History, in part an abstruse discussion of matters not yet fully understood. A sentence or two from the introduction will suggest the flavor of this fascinatingly peculiar volume. "An attempt has been made to strike a mean between the prosy abstruseness of the academic systematist on the one hand, and the imaginative flights of the enthusiastic adaptionist on the other, and to distinguish carefully what are the facts of observation and what deductions may have been read into them. The more abstract conceptions and ideas, however suggestive they may be, which are not always warranted by the facts at one's disposal, are thus relegated to a special end section."]

uous eye in the center of the bloom. It may be straight and almost tubular, or funnel-shaped and flaring. It may be smooth or veined or crimped or even ruffled. In the Chinese sacred lilies it is a swollen orange collar in the center of the white flower. In the "Hoop Petticoat" narcissi it is an inflated thin flaring delicate tube which dominates the entire plant, hiding the strap-shaped segments which are outside and below it. Usually it is the same yellow or white as the rest of the flower; less frequently it may be yellow or orange when the outer segments are white or cream-colored. In the poet's narcissi, as if to make up for the tininess of the flat and fluted central crown, it is frequently edged with a narrow band of intense red. One of the most amazing stories in plant breeding is the way this tiny red band has been stretched and pulled by the hybridizers to color whole crowns red or orange and even to help in turning out fairy-like hybrids with crowns of a delicate muskmelon-pink.

One of the main reasons we can write about the history of garden narcissi in detail is because so many of those who have known and loved them, who have collected new kinds in the wild, or bred new hybrids in their gardens, have been very literate people. It is true, of course, that rose fanciers and lily fanciers and various other plant enthusiasts are sometimes impelled to put their knowledge and enthusiasms down in cold print. Yet it does definitely seem as if narcissus fanciers include a higher proportion of able writers than any other such group. I suspect it has something to do with the plant itself. There is never anything vulgar about a narcissus. Its refinement of form, its delicate coloring, its relatively small flowers make it the kind of a plant most likely to appeal to some one sensitive to the turn of a phrase or a nice choice of words. Whatever the reason the record of narcissus breeding is an unusually full one. Many of the chief figures were British gentle-folk. Engleheart was a Canon of the Church of England; Brodie, a sturdy Scotsman, the head of his clan, and one of the few aristocrats of our time to live in a real stone castle—his very name and title fantastic to American ears, "The Brodie of Brodie"; the Rev. Boscawen, a sturdy gentleman, the Master of the local hunt, who produced elfin narcissi in his vicarage garden by crossing garden daffodils with the miniature *Narcissus cyclamineus*; and Mr. P. D. Williams of Lanarth, Cornwall, a crotchety genius who produced "Fortune," the first hybrid to have a crown as big as that of a daffodil but bright orange-red throughout. I visited him and the Reverend Boscawen and many of the other daffodil breeders and daffodil raisers in Cornwall in a cold, blowy spring, midway between the two world wars.

Cornwall in late winter and early spring is like no other part of the world I have ever seen or ever heard of. It has two climates, side by side. There is more sunshine than in most of England but the air is damp and the

One of the woodcuts from Parkinson's "Paradisi in Sole" [a horrible bilingual pun; "Park in Sun" done in Latin].

These are all Narcissi but mostly sorts which are seen only in rock gardens or special collections. Number 2 is one of the kinds known as "Angels' Tears."

wind is chilly. Much of the country is high, rocky moorland; long, gently sloping sweeps of treeless scrub, beautiful in a wild, moody, romantic way. The gnarled, thick-set bushes stretch all the way to the horizon with here and there a bold clump of rocks sticking up out of them and usually off in the distance somewhere the ancient gray tower of a village church. The raw wind holds back the spring on the moorlands and well into the daffodil season these rocky plateaus have an almost sub-arctic aspect. The narrow little valleys which run back from the coast are out of the wind and in the sun. They soak up the warmth; they are full of bloom; if it were not for the bare branches of many of the trees one would call them sub-tropical. Big, out-of-door hydrangeas are in full bloom and early bulbs make masses of color in every garden. Motoring through the country at that time of year gives one a delirious sense of going back and forth from Iceland to the Riviera. One minute one is up on the cold level stretches of the moor, the bushes wintry bare or with little dark evergreen leaves. Such plants as are in flower are hidden in sheltered corners, and the landscape is gray and brown. Then the road, almost without warning, winds sharply down into one of the little valleys. You can still hear the wind roar in the bare branches overhead but down in the valley it is warm and springlike. The whole landscape has changed in a few hundred feet. Here are little garden plots with growing vegetables; one is shut in down out of the world. The old houses are set into the steep hillside and frequently almost tumbled on top of one another. Dooryards are full of bloom and the grass everywhere is lush and green.

It was in these valleys that the daffodils were grown to sell for cut flowers and as bulbs, in little fields whose windy upper edges were frequently tempered with wattle hurdles or straw matting made into temporary fences. I travelled with a Dutch bulb merchant who was buying some kinds of narcissi and selling others, so there was much gossip of which of the standard varieties were selling well and which were being supplanted on the cut-flower market by something better, much interest, too, in the expensive speculative new varieties which were beginning to make names for themselves in the flower shows and might some day be common enough and cheap enough to sell for cut flowers.

It was a strange cross-section of English society that we visited in that windy Cornish springtime: a retired manufacturer, growing a few choice sorts because he loved them; a young farmer with his eye to the future, growing a few bulbs as a speculation, in a tiny field he had grubbed out in a sheltered hollow at the edge of the moor; the Honorable Margaret So-and-so, who babbled about "poor dear Nancy and her bad accident" so feelingly at tea time that only gradually did I realize that Nancy was a mare who had been injured in yesterday's hunt; experienced flower growers, sturdy yeomen with

A Daffodil Field in Cornwall in 1930

One of the Rev. Boscawen's unnamed seedling daffodils. It was produced by crossing a hybrid between the tiny *Narcissus cyclamineus* and a big yellow trumpet back to *N. cyclamineus*. It is much like that species but a little larger with a longer stem, and it is much more vigorous. In the United States, where *N. cyclamineus* is either difficult or impossible to grow, a variety like this would be a real addition to the early spring border, and it is to be hoped that some alert dealer will eventually put it on the market.

Narcissus "Aerolite"

large families most of whom were busy with the flower harvest which was just under way; a central-European gentleman with a New York accent who had settled down in a beautiful old house and was raising a few high-priced bulbs and buying and selling many more (our previous host, who directed us there had said, "You'd better watch out for him, he's a sharp one!" and when we pressed for further details would say nothing but "just watch out!"). All of these people, as well as the flower-growers whom I had met the week before out in the Scilly Islands just off Lands End, knew about Mr. Williams. They all knew about his new variety, "Fortune," and many of them knew its reputed price at the moment. It was at that time the sensation of the upper reaches of the bulb world and as I remember it Mr. Williams refused my companion's offer of thirty-five guineas a bulb for the few he had not sold ("and he was quite right, too," said the Dutchman, "they're worth more than that").

This was a strange kind of local respect and national horticultural prominence and money in the bank which had come to a retiring aristocrat through his love of daffodils. But P. D. Williams was not the only Englishman of his generation, born in a beautiful old manor house, who was able to live on comfortably in the old house in his declining years because of his love for flowers. When he came back home from the University he indulged his love of plants and put his excellent mind to work by assembling a choice collection of exotic shrubs.

As he grew older, Mr. Williams became increasingly interested in narcissi. He began his work with them just at the time that daffodil breeders were beginning to see what might be accomplished by intelligent breeding. It had gradually been discovered (more or less by accident) that any two species

Narcissus "Firetail"

of Narcissus could be crossed with one another, and that most of the hybrids one got in this way were fertile enough to be used as the parents of still further crosses. Most of the breeding was centered upon the early yellow daffodil and the "Poet's Narcissus," late-flowering and white. The former was typically golden yellow throughout, the flower with a cylindrical crown longer than the petals and smooth in its tubular portion but more or less ruffled at the edges. The "Poet's Narcissus" has no trace of yellow. The perianth is a pure glistening white, the crown so small that for all practical purposes it is scarcely a crown at all and just looks like a circular spot in the center of the flower. Examination shows that it is raised above the petals like the long tubular crown of the daffodil but it flares out side ways so strongly as to be almost flat on the face of the bloom. It is more or less greenish or straw-colored, finely crimped or pleated throughout, and frequently bearing at or near its margin an intense narrow line of a dark reddish orange. If we cross these two narcissi, the hybrid is about what one might have expected. When the flower opens (later in the season than would a daffodil, earlier than a "Poet") it is a light yellow which fades from day to day until it is almost white. The crown is medium-sized, shorter than the petals, conspicuously crimped and somewhat flaring. The orange-red line is gone but there is a deeper orange tone to the crown than to the petals, and this orange tendency deepens towards the edge. The hybrids, as a matter of fact, turn out to be a kind of daffodil which has been known in gardens (and occasionally found wild-growing) for hundreds of years, the so-called "Incomparables."

When Mr. Williams started in his career it was just beginning to be realized that though the red line disappeared in the immediate hybrid, its poten-

tialities were still there. Not only could it reappear in the grandchildren of the original cross but the line itself exhibited that variability which is so characteristic of every feature of a hybrid. In some seedlings the band would be narrow, in others it would be broad—sometimes scarcely a band at all, the color being strictly limited to the fringed edge of the crown. Sometimes the band of color would be sharp, forming an exact circular ribbon of orange against a lemon-yellow background; in other seedlings it would shade off gradually, sometimes so gradually suffused as scarcely to seem like a band at all. The color, too, varied. It could be only a slightly more orange-yellow than the background or a deep buttery color; sometimes deep enough that by straining a point you could call it red. This is the hybrid variability which is the raw material of a plant breeder, and it was with such seemingly infinite variants of form and color and texture, and substance and time of blooming that Mr. Williams worked.

Associated with this variability is another phenomenon which is the despair of most plant breeders. There is great variability but there are powerful trends in the way certain characters go together: yellow and earliness, for instance, in these narcissi; they went in together and they stayed together. In spite of much trying no one has yet produced a late-blooming yellow daffodil. Whatever the forces that make a species hold to its chief characteristics generation after generation and millenium after millenium, some of them are so strong that they continue to work even in these variable hybrid assemblages. The things which went into the original cross together tend, on the average, to stay together. Bright color went into this particular cross with small crowns. Pick out the largest crowned daffodils in the breeding plots today after generations of selective breeding. None of them have deep orange-red; few have anything more than a suggestion of color. Pick out from all the crosses of all the breeders the seedlings with the most intense color in the crown. They will mostly have crowns on the smallish side, though nearly all will be larger than the crowns of the original Poet's Narcissus which brought in the color in the first place. Most significantly, some of them will be a good deal larger than others, so one is not absolutely stopped by the tendency of what went in together to stay together; he is merely hindered. The same holds for color in the crown and yellow in the perianth. Color and white went in together, and though many of the colored seedlings have various degrees of yellow a strong clear golden yellow is very definitely associated with a complete absence of any color in the crown. Now one of the combinations most gardeners and daffodil fanciers would like to have would be a bright yellow narcissus which did not fade as it aged, with a large smooth crown of a deep orange-red. This was one of the goals which Mr. Williams set himself and one can see that it was doubly difficult. The red of the Poet's Narcissus had somehow to be pried away from the

Single and double daffodils as illustrated in Parkinson's "Paradisi in Sole," the first great English monograph on garden flowers.

small fluted crowns and from the brilliant white with which it is naturally associated and hooked up with the golden-yellow color and the large cylindrical crown of a daffodil.

All these things and more are apparent in a collection of modern narcissi —to one who knows the genus. Daffodils and Poet's Narcissi are not the only species which have contributed to the garden daffodil of today. Jonquils have been used increasingly, though usually in such small proportions of the total ancestry that their influence is not very apparent. Cross a daffodil and a jonquil, and the immediately resulting hybrid is a small-flowered thing more or less like Campernelle jonquils. Take these hybrids and cross them back to daffodils and then interbreed these quarter bloods. Among such secondary and tertiary hybrids it is possible to find flowers large enough to please a daffodil fancier and with added improvements which have come in from the jonquil ancestry. These daffodils-with-a-touch-of-jonquil show the jonquil touch in their brilliant golden color, in the improved substance of the blooms which keeps them in flower longer, in the trim edges of the crown, and in their proportionately longer stems. Nearly always, too, there is an undertone of the heavy sweetness of jonquil perfume mixed in with the honest forthright odor of the daffodil.

Other species have been used to a lesser degree. "Angels' Tears" Narcissi have been used to produce charming icy-white (or white and citron) hybrids of delicate form. *Narcissus cyclamineus*, which flowers in late winter and has a tiny flower like a little doll's hammer of pure gold, has given us such early daffodils as "February Gold," in many ways the most satisfactory narcissus for the average St. Louis garden. Crosses of Poet's Narcissi and "Paper Whites" have produced a whole new race, the "Poetaz" hybrids, mostly too tender for St. Louis gardens. From crosses between jonquils and Poet's Narcissi came the lovely *Narcissus gracilis*, a slender long-stalked narcissus with strawy yellow flowers in an open cluster. It is amazingly resistant to hot winds and is the last variety to bloom in our collection.

Through the kindness of Mr. Jan De Graaf, the Garden was presented with several hybrids between the "Hoop Petticoat" narcissi and various daffodils. They had appeared as rogues in his Oregon bulb fields and were scorned by daffodil experts because they were big coarse things with little resemblance to the exhibition type favored in daffodil shows. Grown as garden flowers, they have a charm of their own and they are in many ways one of the finest things in our collection. Ultimately, the Garden hopes to name and introduce the best of them. Even a daffodil expert would like them if he could forget that they are daffodil hybrids and just think of them as a new type of spring bulb appropriate for the perennial border. The flowers are pale yellow when they first open, fading eventually to an off-

white. The big trumpety flowers are as large as your hand, the trumpet borne almost upright. They stay in flower for weeks and have hybrid vigor enough to bring them through sleet storms from the North or hot winds from the Southwest. A well-established plant with several blooms is a sight to see. It does not look at all like the dainty "Hoop Petticoat" narcissus which was one of its parents; it scarcely reminds one of a daffodil. In many ways it seems more like some kind of a hardy, spring-blooming amaryllis, but it is a splendid plant for Missouri gardens and within a few years we shall have enough bulbs so it can begin to be grown in St. Louis gardens.

The Hoop Petticoat Daffodil shown to the same scale as the illustrations on page 153. These tiny flowers, nearly all corona, spring almost directly from the turf, producing a dainty elfin effect.

THE BEST NARCISSI FOR NATURALIZING

EDGAR ANDERSON

Though daffodils and other narcissi have been used for naturalizing more frequently than any other bulb there is little exact information about which varieties are best for the purpose. So far as we can find out, the Garden's experiments in its Arboretum at Gray Summit are the only comprehensive tests which have ever been carried on. After more than fifteen years of experiment, we can now suggest with some confidence that the following varieties (of those readily obtained from dealers) are the best for naturalizing in this area. They have been listed in the order of their bloom.

FEBRUARY GOLD.—Bright yellow. Flowers in March. Also best early yellow for perennial border.

EMPEROR.—Mid-season, soft yellow.

SIR WATKIN.—Opening yellow, crown fading almost to white. Very tolerant of heavy soils.

RECURVUS.—Still one of the finest of the late-flowering Poet's Narcissi. Early May. If possible buy bulbs directly from the raiser so that they will be out of the ground for only a few days.

GRACILIS.—Pale yellow, dainty. Hard to get but worth the trouble. Resistant to late spring heat waves.

SOME FACTS ABOUT THE GARDEN

The Missouri Botanical Garden carries on the garden established by Henry Shaw over a century ago at "Tower Grove," his country home. It is a private institution with no public support from city or state. The old stone walls and cast-iron fences, the Linnean House, the Museum, the Mausoleum and the "Old Residence" all date from Mr. Shaw's time. Since his death, as directed in his will, the Garden has been in the hands of a Board of Trustees who appoint the Director.

The Garden is open every day in the year (except New Year's Day and Christmas) from 9:00 a. m. until 7:00 p. m., April to November, and until 6:00 p. m., November to April, though the greenhouses close at 5:00 p. m. The Garden is nearly a mile long and has several entrances. The Main Entrance, the one used by the general public, is at Tower Grove and Flora Place on the Sarah bus line. The Southampton buses (No. 80), direct from downtown, pass within three blocks of this entrance and stop directly across the street from the Administration Building at 2315 Tower Grove. The latter is the best entrance for students, visiting scientists, etc. It is open to such visitors after 8:30 a. m, but is closed on Saturdays, Sundays, and holidays. There is a service entrance on Alfred Avenue, one block south of Shaw Avenue.

Since Mr. Shaw's time an Arboretum has been developed at Gray Summit, Mo., opposite the junction of routes 50 and 66. It is open every day in the year and has two miles of auto roads as well as foot trails through the wild-flower reservation. There is a pinetum and an extensive display of daffodils and other narcissi from March to early May.

MISSOURI BOTANICAL GARDEN BULLETIN

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Missouri Botanical Garden Bulletin

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THE FAVORITE CHRISTMAS PLANT

HUGH C. CUTLER

The poinsettia is the most popular Christmas plant but one of the most difficult to keep in the house for long. Soon after the plant arrives in the home the leaves usually grow pale and drop until only a droopy red head is left to top a bare stem. The florist is then accused of sending a sickly plant, and the Garden is called for advice on treatment. The florist is not to be blamed, and by the time the Garden is called there is little than can be done to save the plant as an ornament for this year.

You can make your poinsettia last longer if you keep it in a sunny window with a temperature between 65° and 70° F. and shield it from cool drafts and sudden chills. The plant should be watered whenever the surface of the soil in the pot is dry (this may be daily at the temperature the poinsettia prefers) but never allow water to stand in the saucer. Even with the best of care, in a few days—or, if you are fortunate, a few weeks—the leaves will yellow and drop and the stem will be almost bare. Because your plant was so gaudy and cheerful, you may want to have a poinsettia next year, but don't try to save your plant just because the price the florist charges seems high. Unless you have the right kind of a place to keep your old plant and unless you really enjoy working with plants and seeing them grow, you will find it more satisfactory to buy a new plant next December.

Of all the instructions for the window gardener's care of poinsettia, the most practical I have seen in print were in an article that the Garden Floriculturist, Paul A. Kohl, wrote for the December 1938 BULLETIN: "After the plants are bare, . . . lay them away in a cool part of the basement until May, and do not water them. . . . In May cut the bare stems back to six or eight inches above the rim of the pot. Shake some of the soil from the roots and re-pot into a six- or seven-inch pot. See that there is some broken crock over the hole in the bottom of the pot and use good garden soil. After re-potting the poinsettias, water them, then plunge the pots outdoors in a sunny position, in cinders or soil about three inches deep. Within a few

Poinsettia plant cut back and grown a second year.

weeks several shoots will appear, two or three of which should be kept and the others removed. These branches will grow quite tall in one season and must be tied to a support, preferably a bamboo cane. It is not absolutely necessary to start the plants in May. They may be started in June and even early July. Late planting will prevent the poinsettias from growing too tall, but weak plants that have been kept dormant too long often fail to grow. The pots should be lifted occasionally. If this is not done, a large root may grow through the hole of the pot into the soil beneath, and the severing of this root will cause all of the leaves to drop when the plant is lifted in September.

"A better way to grow poinsettias, and one more fascinating because it requires skill, is to start new plants from cuttings in the early summer; in fact, that is the way the commercial grower produces poinsettias for Christmas. He would never think of growing old plants a second and third year.

If poinsettias are to be grown from cuttings, the stock plants should be brought into the light in May or June, the stems cut back to a foot above the pot, and the plants given a thorough soaking. Syringing the stalks whenever possible will soften the wood and hasten the development of the eyes. Cuttings will be available in June and July, which are the two best months to root them. Those rooted in August will yield small plants with imperfect bracts. Cuttings are removed from the stock plants when they are four or five inches long, a stub of at least an inch long being left to permit secondary sprouts to develop for later cuttings. As soon as the cuttings are cut from the stock plants they are dropped into a bucket of cool water to prevent "bleeding." Poinsettias belong to the family Euphorbiaceae, and many members of this family contain a heavy milk-white sap

Rooted Poinsettia cuttings

which flows from the plant as soon as it is cut. Later, when the surplus leaves have been removed and a fresh cut is made beneath a node, the cuttings are again placed in water. After fifteen or thirty minutes they are planted in pots or boxes of sand which has been watered and tamped. Make an opening in the sand with a dibble, about the size of a lead pencil, place the cutting two inches deep, and pack the sand around it. When all of the cuttings are in place, water thoroughly to settle the sand and shield them from the wind with paper or burlap. In the second week a little more air is admitted to the propagating box, and later it is left uncovered each night. Cuttings in well-drained boxes should be watered each morning and the foliage sprayed several times a day during the first two weeks. After three or four weeks, at which time the cuttings should be rooted, they are potted into 2½-inch pots of light soil composed of garden soil, leaf-mold, and

Euphorbia pulcherrima

Euphorbia pulcherrima var. *plenissima*

sand. They are again shielded from the sun and wind for a week or more until root action has taken place. From then on the young plants will grow rapidly and must be shifted into four- and five-inch pots when numerous roots reach the sides of the pots.

"Poinsettias grown outdoors must never suffer from cold. A succession of chilly nights in August and September will cause the plants to shed their leaves. In the house, grow the plants in a southern window or sunroom and in a temperature that never registers less than 60° F. If these conditions cannot be supplied, save your time and effort for the culture of other worth-while plants that are less exacting in their requirements."

Center of poinsettia: A, stamens; B, pistil; C, nectar glands.

The poinsettia is a native of Mexico and Central America where it is popularly called the *Flor de Noche Buena* (Flower of the Holy Night). When grown outdoors in Mexico and our warmer states or in the greenhouse the plants often grow to be more than twelve feet tall. Dr. Joel Roberts Poinsette, first United States ambassador to Mexico, introduced the plant to Charleston in 1828 where it did so well that other gardeners soon grew it. Dr. Poinsette sent plants of a red variety to Robert Buist, a Philadelphia nurseryman, who recognized its similarity to some other spurges and named the plant *Euphorbia poinsettia* in honor of the man who brought it from Mexico. When the plant was grown in Scotland, Professor Graham thought it so unusual that in 1836 he described it as a member of a new genus, calling

it *Poinsettia pulcherrima*. In the same year a colored plate was published in *Curtis's Botanical Magazine* (reproduced on our cover). Today botanists agree that the scientific name of the poinsettia should be *Euphorbia pulcherrima*, and the name of the man who introduced it to American and European plant lovers is preserved in the widely used common name.

Flowers of the poinsettia are inconspicuous structures borne in small green cups in a cluster at the tip of the stem. The very conspicuous glistening drops on the margins of the cups are drops of nectar exuding from the nectaries. The bright red whorls which most people think are parts of the flowers are modified leaves, called bracts.

In the variety *plenissima*, most of the flowers are transformed into red bracts giving a fuller center. While the plant is certainly unusual, it lacks the sharp and simple outlines which make the poinsettia so attractive. The *plenissima*, or double, variety was discovered in 1872 in a Mexican Indian village near the state of Guerrero. Not long afterwards a New York florist paid one thousand dollars for this variety. A white variety discovered in Mexico about 1835 is occasionally grown today but, like the double variety, is valued more for its oddity than its beauty.

A view in one of the Garden greenhouses showing some of the poinsettias being grown for the Poinsettia Show.

Seed-pod of Poinsettia

Poinsettias can be grown from seeds. According to Mr. Kohl, "The seeds are large and there is no difficulty in germinating them. Those sown in early June will give plants four feet high, and there will be very little difference between these plants and those grown from cuttings."

"The line-drawing clearly shows the structure of the central portion of a poinsettia, and if anyone is inclined to experiment he should take some of the stamens and rub the pollen onto the pistils. This should be done more than once in order to insure pollination, and it would be well to transfer the pollen from one plant to another as the poinsettia is said to be self-sterile. If the pollination has been carefully done, a large fat seed-pod should form within a short time. The seed should be ripe in about four months. It is then stored until June when it may be sown in pots of sandy soil. Plants started from seed are treated the same as those grown from cuttings."

New Poinsettia Varieties at the Garden—Thirty years ago the Garden grew four varieties of poinsettias for the Christmas Show, a red, white, pink, and a double red. These bore no varietal names but were recognized only by their color or form. Later, two reds, "Mrs. Paul Ecke" and "Oak Leaf," were added, both of which are superior to the old red type. This year four newcomers have been introduced to improve the display and for comparison with the older varieties. Of these, "Ecke White" has better and larger bracts than the old white variety. It is hoped that the double "Henrietta Ecke" will retain its center cluster of bracts, the loss of which was a weakness of our old double red. "St. Louis" is being used more for the name than for any improvement. It propagates easily but its bracts do not have the heavy texture of "Mrs. Paul Ecke." The "Improved Albert Ecke," one of newer varieties, has very dark foliage.—P.A.K.

CHRISTMAS CACTUS

LADISLAUS CUTAK

We all know and love the poinsettia because it is symbolic of the Christmas season, especially in our own country. However, there is still another American flower that reminds us of this festive season, and it is the Christmas Cactus. To a plant lover, no more fitting gift could be given at this time of the year than this plant in full bloom.

The flowers of the Christmas Cactus are very beautiful with a shape unlike that of any other cactus. We might mention, though, that the blossoms of the Rat-tail Cactus (Aporocactus) superficially resemble it, but there are several characters to separate them, such as position on the stem, bristly ovary, etc. The bud of the Christmas Cactus arises from the truncate tip of a short, flattened joint. The first sign is a little nubbin which points and elongates until the perianth segments (petals and sepals) unfurl. Each individual flower measures two to three inches long and usually hangs from a somewhat pendent stem. The flower has a small, smooth, pear-shaped ovary topped by a long tube clad with the colorful perianth segments which have a tendency to spread and bend back against it. The stamens and pistil are exserted beyond the throat.

The botanical position of the Christmas Cactus seems to be unsettled. Several specialists have tried to place it without much success. The plant usually known as the Christmas Cactus possesses fleshy, flattened, leaf-like joints with rounded crenations and handsome, deep rose, nearly regular flowers and is distributed by nurserymen under the name *Zygocactus truncatus*. It generally begins to flower early in December, but may bloom as early as November and as late as March or April. However, there is another cactus, with more irregular or zygomorphic flowers, which more nearly corresponds to the early descriptions of the *Zygocactus truncatus*. The margins of its joints have sharp teeth rather than the rounded crenations of the former and also bear two noticeable claws at the otherwise blunt joint tips. Because of the prominent claws this cactus is commonly known as Claw or Crab Cactus, and in the author's opinion should never be called Christmas Cactus. The species boasts a number of handsome varieties which may begin flowering more or less profusely as early as October. The flower colors range from scarlet to carmine to nearly white. One form displays its mass bloom around Thanksgiving, and for this reason is known as the Thanksgiving Cactus.

Plants of the genus Schlumbergera are very similar to those of Zygocactus but have symmetrical flowers with much narrower petals disposed in star-like fashion. Cacticians are now aware that the supposedly true *Zygocactus*

truncatus is *not* the Christmas Cactus but at the same time are uncertain what to call the plant commonly known as Christmas Cactus. Dr. Reid Moran, the latest authority to delve into the mystery, suggests that *Schlumbergera Bridgesii* is the correct botanical name for the Christmas Cactus. Whatever the final verdict may be, the Christmas Cactus is sure to bloom handsomely during the holiday season and make many a plant lover cheerful during that time.

Growing the Christmas Cactus is not difficult at all. Since it is a jungle inhabitant it should be treated as such and that means it will require a richer soil mixture and an ample supply of water in addition to warmth and partial

Flowers of the Christmas Cactus

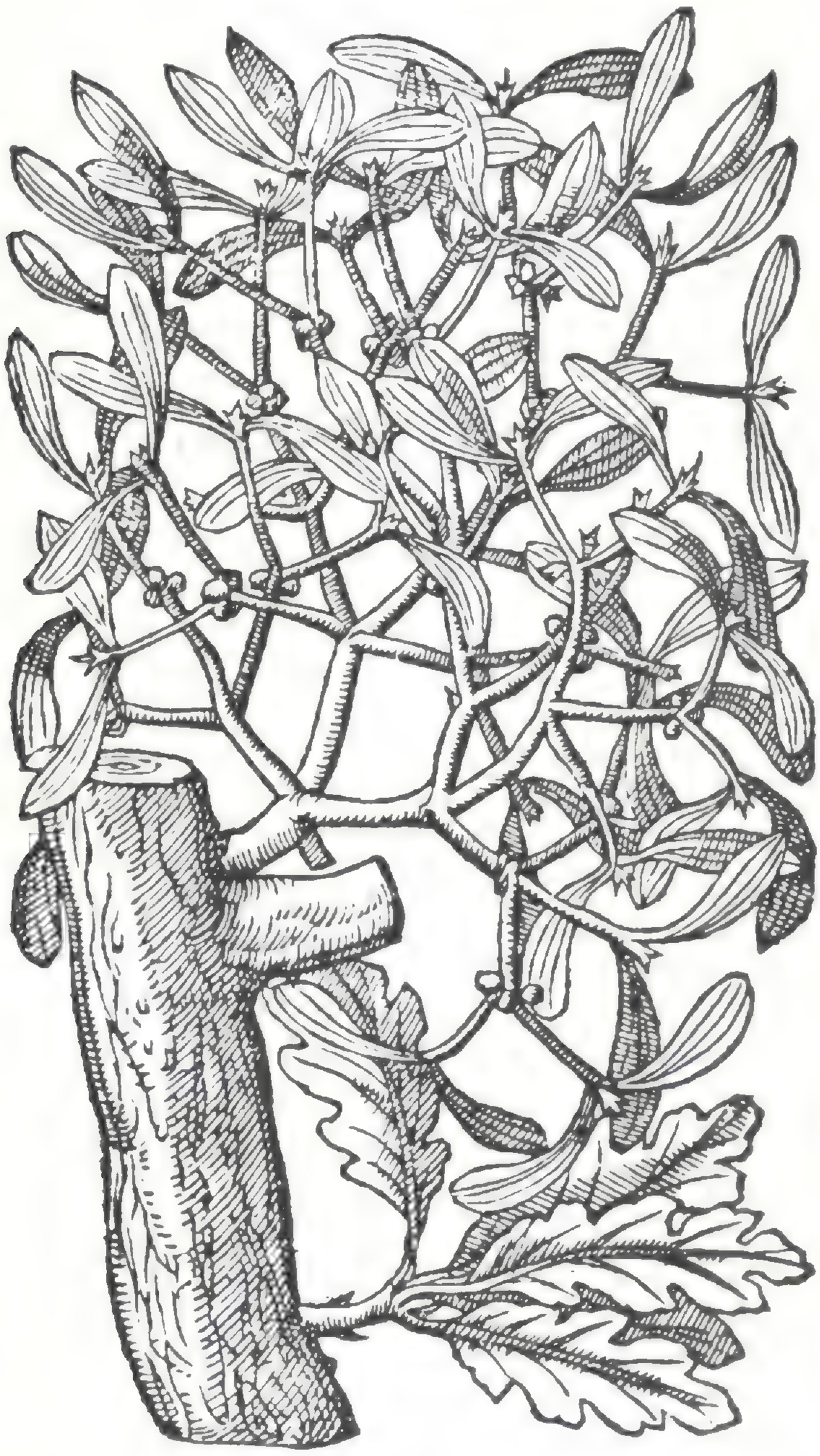
shade. A soil mixture composed of light loam, well-rotted leafmold, some sand, and a generous sprinkling of well-decomposed cow manure will suit the plant well. It is advisable to place the plant outdoors during the summer, under a tree or in some other shaded spot, where it will grow sturdier in the fresh air and will be able to ripen its wood more thoroughly. An occasional application of liquid manure is beneficial during the growing season. When liquid manure is not available, any complete plant food should be applied at three-week intervals.

A rest period is considered a very important factor if abundant bloom is to be expected. It is this lack of rest that makes the plant a shy bloomer. A rest may be started about the middle of September and continued for about two months. Reduce the water supply until only sufficient to keep the soil from drying out completely. Immature joints, easily recognized by their smallness and weakness, should now be pinched off. During the rest period some joints or links will drop off, but this should cause no alarm as this is a natural condition. A rest period hinders vegetative growth and induces a strong formation of buds. When the tiny buds begin to show, watering may be resumed, usually every other day. While the buds are small it is advisable not to sprinkle overhead, not to move the plant about, and to avoid drafts. Failure to take these precautions might cause the buds to blast and fall off. A sudden change in temperature is also injurious. Only when the blossoms begin to unfold can the plants be moved about or sprayed. A second rest period should follow the blooming season. Four to six weeks of this should suffice. During this period the cactus will have a tendency to become weak and drooping, some of the joints even dropping off, but this need not cause alarm. Usually two or three waterings will suffice during this resting stage. After dormancy the shrivelled joints take on a healthier appearance and new stems develop. When warm weather arrives the Christmas Cactus may be taken outdoors in a well-lighted location, but not in direct sunlight, to begin another cycle.

The Christmas Cactus need not be transplanted often. A plant may be kept in the same container for several years if the drainage is perfect, the soil light and porous, and plant food given in season. The Christmas Cactus will flourish and flower on its own roots but since the branches are weak the flowers have a tendency to hang below the container where they are not seen to advantage. Grafted specimens, which form umbrella-like heads, are desirable. Choose a small cutting of the Christmas Cactus for the scion and a plant of Pereskia or Cereus for stock. Cut stock to desired height and make an inch-deep slit at top. Then shave epidermis on both sides of the scion and insert the scion into the slit of the stock. Run a cactus spine through the united portions and wrap taut with raffia to insure perfect union.

MISTLETOE

Superstition has credited mistletoe with all sorts of powers from warding off lightning and putting out fires to driving away witches and permitting kissing by those beneath the plant. Today, although wide use is made of the kissing opportunities mistletoe affords, the other virtues are largely forgotten. Most legends about the parasite come from Europe. The Norse had



The European Mistletoe growing on the oak tree. A woodcut from l'Obel's *Kruydtboeck*, 1581, a copy of which is in the Garden library.

elaborate myths about the use of mistletoe as a tool for evil-doing by Loki, the spirit of evil, and the eventual placing of mistletoe under Freyja's custody to prevent any further harm to the gods. Freyja, the Norse counterpart of Venus, proclaimed the mistletoe a symbol of love and originated the sometimes pleasant custom of allotting a kiss to those who stand under it. Old rules required that one berry must be plucked from the plant for each kiss taken, but now that the custom has spread far from the native home of mistletoe and plants are not free for the taking, this rule is usually ignored.

There are many kinds of mistletoe, all except one of them parasitic on other plants. The European mistletoe *(Viscum album)* is a quite distinct kind from the one which has been accepted as the mistletoe in the United States *(Phoradendron flavescens)*, but the difference between the two does not prevent Americans from investing the New World plant with Old World traditions. Most mistletoe sold in this country is collected here and only a small amount of the European kind is imported.

The male and female flowers are borne on separate mistletoe plants, although a single host plant may have both kinds growing on it. When the flowers open, usually in the winter in our southern states, pollen from a male plant is carried by the wind to a female plant. The fruit develops slowly and does not become ripe and translucent white until nearly a year later.

In Europe the mistletoe berries are occasionally collected and the viscid pulp used as bird lime, a sticky substance which is spread to entrap the feet of small birds who step into it. There apparently is no well-known use for the plant in this country. In many regions it is a serious pest, growing so large on trees and shrubs that the host leaves are shaded and the host plant eventually starves.—H.C.C.

The American Mistletoe is native within a short drive of St. Louis. It grows on large trees in the flood-plains of such rivers as the Mississippi, the Ohio, and the Wabash. When one motors southeastward this time of the year the big bunches of the mistletoe begin to get conspicuous after one passes Cape Girardeau. Seen in the distance they have somewhat the effect of big green squirrel nests up in the trees. Seldom or never does one find a plant within easy reach of the ground. I have often wondered whether this means that it does not grow well there or whether the bunches high up in the trees are merely those which were too difficult to collect for Christmas use.

OTHER COMMON CHRISTMAS PLANTS

The Jerusalem Cherry *(Solanum pseudo-capsicum)* grows well in the house when given proper care but when the room is too hot and dry or if there is any trace of gas present, the leaves and berries will quickly drop. The plant should be kept in a cool room, about 50° F. if possible, and watered well. The soil must be well-drained because the plant does not like to stand in water. When the leaves and berries fall in the spring, the plant should be cut back and kept in a cool place, preferably where the temperature is about 40° and there is a little light. It should be watered about once a week, although it can be left unwatered as long as three or four weeks if the basement is cool and moist. In May the pot should be plunged in the ground in a shady spot, fertilized and watered well throughout the summer, and in September returned to the house. The small white flowers which bloom in the summer are inconspicuous but by fall the plant is quite decorative because the leaves are an attractive shade of green. The bright orange-red cherry-shaped fruits which appear in winter are poisonous, like those of the nightshade and potato, and unlike the tomato, pepper and eggplant, all members of the same plant family.

The False Jerusalem Cherry *(Solanum capsicastrum)* is similar to the Jerusalem Cherry except that its fruits are pointed. It can be grown easily by following the methods described for growing the Christmas Pepper.

The Christmas Pepper *(Capsicum frutescens)* has tiny bright scarlet peppery fruits which can be used as a spice. The plant will tolerate more heat than the Jerusalem Cherry and, besides being more hardy, is often considered a more attractive plant. The Christmas Pepper can be grown by planting seeds in a pot in April or May, pricking the seedlings off into small pots, and then shifting to larger pots, up to 5 inches, as the roots crowd the pots. By mid-June the plants can be plunged in sand, peatmoss or vermiculite in a sunny spot in the garden. They should be watered occasionally. Some gardeners prefer to set the plants out, then in September dig them up with some earth attached to the roots and pot them, watering well and keeping the pots in the shade for at least a week. In either case the plants should be brought into the house before cold weather arrives. While the plants withstand quite a wide range of conditions and will even live if they are not watered for several days at a time, they last longer and look better if they are kept in a cool and sunny spot and watered frequently.—H.C.C.

The odd little seed-balls of the native Sweet Gum make most attractive Christmas tree ornaments. A beautiful old-fashioned effect can be achieved by spraying some of them with gold and some silver, and using nothing else as tree trimming but candles and strings of popcorn and cranberries strung alternately.

DECEMBER IN THE GARDEN

After spending November week-ends raking fallen leaves, the home gardener often forgets that there is much green left for the winter. Here at the Garden we still have only a few evergreen conifers, all of them young replacements for trees killed by smoke before the St. Louis smoke laws became effective. The most conspicuous and useful winter greenery to be seen is the Garden's own "MBG Bulgaria" ivy which covers the ground and climbs the trees in the Mausoleum. This ivy was described and pictured in the BULLETIN of last June. *Friends of the Garden* who stop by the office at the Main Entrance at the end of Flora Boulevard during December and January can take home three small plants for their own gardens. "MBG Bulgaria" spreads and roots so rapidly that a few plants will cover a large area by the second year.

Beside the entrances to the Mausoleum grounds are plants of the evergreen Lily-of-the-Valley Bush *(Pieris japonica)*, a member of the same family as the huckleberries and rhododendrons. Its pale green leaves add variety to the winter scene. To the east of the Mausoleum enclosure is a deciduous holly *(Ilex decidua)* with an excellent crop of bright red berries on its naked branches. The birds are eating these but there are so many berries on the American hollies *(Ilex opaca)* that the birds probably won't get all of them before January. The American hollies have more berries this year than almost any other year and visitors are showing interest in the plants. An excellent book, "Hollies," by H. Harold Hume, was reviewed in this year's September BULLETIN. St. Louis gardeners will find a practical article by Paul A. Kohl, the Garden Floriculturist, in the November 1947 BULLETIN and those who attend the Garden's Plant Propagation Sessions will find that holly responds well to the new methods for rooting cuttings.

Poinsettias, with a few of the late flowering chrysanthemums, like the white and yellow Garza Supreme varieties, to provide a contrast, will fill the display house from December 11 to about January 10. In the Linnean House some camellias are in bloom but most of the plants will not be in flower until February.—H.C.C.

Osmanthus ilicifolius, another evergreen shrub of southern gardens, is blooming well this year in the Linnean House. It has dark green leaves much like those of the holly but smaller. The flowers are tiny, ivory-white, and delightfully fragrant. Though not as conspicuous as the Camellia it is a charming shrub and one that seems in keeping with the Linnean House which every year looks more like an old-fashioned garden.

COURSES FOR AMATEURS

Several courses for amateurs will be offered at the Missouri Botanical Garden during the winter and the spring.

Orchids for Amateurs.—With a little know-how and the right kind of plants some orchids can be flowered successfully in a bay-window or sun-porch. Many of them make excellent subjects for the amateur greenhouse as was demonstrated in the special BULLETIN prepared last year by the St. Louis Orchid Society. A demonstration class in potting and caring for orchids will be held at the orchid greenhouses, Missouri Botanical Garden Arboretum, Gray Summit, Mo., on Tuesday, March 9, 1954. The class will convene promptly at 10 A. M., with demonstration period from 10 to 12. During the noon hour the Garden will provide hot coffee, and class members are urged to bring their own sandwiches and enjoy a social noon hour together. The afternoon session will be from 1 to 3, and every member will be provided with an orchid plant in bud or bloom to take home as practice material. The orchid greenhouses are just off Highway 66 at its junction with Highway 50 at the edge of Gray Summit, 35 miles west of St. Louis.

Registration limited to 50. Fee $10.00, which includes all materials. If the demand is great enough a second orchid day will be arranged on Wednesday, March 17th. To register, send $10 in cash, check or money order to: "Orchids for Amateurs," Missouri Botanical Garden, 2315 Tower Grove, St. Louis 10, Missouri.

New Methods in Plant Propagation.—New methods of rooting cuttings worked out by Mr. Lewis Lipp of the Arnold Arboretum are revolutionizing the making of cuttings by amateurs and professionals alike. Each demonstration class of these new methods will meet for a single two-hour session on the following days in January, at the Garden in St. Louis:

Tuesday morning, 10–12 A. M., January 12, January 19, January 26.

Wednesday afternoon, 2–4 P. M., January 13, January 20, January 27.

Friday evening, 8–10 P. M., January 15, January 22, January 29.

Each student will be given all materials for constructing a "Lippigator", including a cypress wood base with supporting wire frame and plastic covering. He will also be instructed in making various kinds of cuttings and how to fill the Lippigator with them. The cuttings can then be rooted at home on a sun-porch or in a bay-window. This propagating unit can be used indefinitely in the home for a continuous supply of rooted plant materials.

Fee $10.00 for the two-hour session, which includes all materials. To register, send cash, check, or money-order to: "Plant Propagation", Missouri Botanical Garden, 2315 Tower Grove, St. Louis 10, Mo., and specify on which day you wish to come.

NOTES

The dendrology class of the University of Missouri School of Forestry, Columbia, spent the day of November 12 at the Garden Arboretum studying coniferous plantings.

Mr. Ladislaus Cutak, Horticulturist in charge of Conservatories, acted as one of the judges in the ninth International Mississippi Valley Salon of Photography and Nature Exhibit, at the City Art Museum, October 22–November 5.

The fourth number of Volume 40 of the ANNALS OF THE MISSOURI BOTANICAL GARDEN has recently been issued, containing two papers: "Some X-Ray Effects in Petunia," by Henry A. McQuade, and "Some Lichens of Tropical Africa," by Carroll W. Dodge.

Mr. August P. Beilmann, Manager of the Arboretum, was the recipient of the 1953 conservation citation of the St. Louis Audubon Society, through which the Society honors him as "a naturalist, a horticulturist, an outstanding forester and water management expert, and a leader in conservation education and action."

Recent visitors to the Garden library and herbarium include: Mr. Franklin B. Buser, of the Department of Botany, University of Illinois, Urbana; Mr. B. O. Bracey, of B. O. Bracey Orchid Company, Santa Ana, Calif.; Dr. J. T. Baldwin, of William and Mary College, Williamsburg, Va.; Dr. E. R. Spencer, Soil Expert, of Lebanon, Ill.

Mr. George H. Pring, Superintendent of the Garden, acted as chairman of judges at the Oklahoma City Orchid Show, November 28-29. On November 27 he was on television (WKY) at Oklahoma City, speaking on "Orchids" and showing some of the Missouri Botanical Garden specimens. One of the Garden hybrids displayed at the show, *Brassolaeliocattleya* "Henry Shaw," was given an "award of merit" by the American Orchid Society.

For the first time in many years Mr. Shaw's old country home "Tower Grove" is open regularly to visitors, from one to four every afternoon, including Sundays. Under the leadership of Mrs. George H. Pring, the Federated Women's Clubs of this area are being hostesses who will act as guides in the building. It was possible to get off to an early start when members of the Marguerite Krueger Conservation Club served as hostesses for the entire month of November on very short notice. Though not completely furnished, the mirrors and chandeliers give some indication of how the rooms must have looked in Mr. Shaw's day. Several old St. Louis families have donated furniture of the same period as the house, and minor repairs and repainting will get under way this month.

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